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Redescription of *Oxychilus meridionalis* (Paulucci, 1881) (Pulmonata: Zonitidae)

Giuseppe Manganelli & Folco Giusti

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KEY WORDS: Gastropoda, Pulmonata, Zonitidae, *Oxychilus*, *O. meridionalis* (Paulucci, 1881), redescription, taxonomy, nomenclature, distribution, conservation, Italy.

ABSTRACT *Oxychilus meridionalis* (Paulucci, 1881) belongs to *Oxychilus* (s.str.) sensu Giusti & Manganelli (1999), a "subgenus" of *Oxychilus* characterized by: penis with flagellum (1); penial retractor inserted at apex of flagellum (2); epiphallus usually longer than proximal penis, its internal wall with slender longitudinal pleats (3); mucous gland mainly vaginal (4); long mesocone of central tooth (5). It is a small to medium-sized species, with a yellowish, yellow – brown or greenish shell, very variable in shape and size. It can only be identified by anatomical characters: penis without clear distinction into proximal and distal parts ("bottle-neck" portion of proximal penis absent) (1); distinctive internal ornamentation of penis consisting of 5-6 to 13-15 longitudinal pleats, usually straight, sometimes wavy or lobate except around epiphallus opening into penis where there is a system of smaller pleats, radially disposed, sometimes fragmented into rows of variably large papillae) (2).

O. meridionalis has a very puzzling nomenclatural-taxonomical history due to its wide conchological and anatomical variability not realized by early authors. Consequently it has been reported in the literature under many different names, three of which are its junior synonyms: *Hyalinia isseliana* Paulucci, *Oxychilus tongiorgii* Giusti, 1969, and *O. forcartianus* Giusti, 1969. Other names recently erroneously used for this species include: "*Oxychilus obscuratus*", "*O. porroi*", "*O. alliarius*", "*O.* cf. *draparnaudi*" and "*O.* (cfr.) *uziellii*" (Forcart, 1967, 1968; Giusti, 1969b; Giusti & Mazzini, 1971; Sabelli *et al.*, 1977).

O. meridionalis is not globally threatened. It has a narrow distribution, limited to Tuscany and eastern Liguria, but does not seem to be under any particular threat at present.

RIASSUNTO *Oxychilus meridionalis* (Paulucci, 1881) appartiene ad *Oxychilus* (s.str.) sensu Giusti & Manganelli (1999), un "sottogenere" di *Oxychilus* caratterizzato da: presenza del flagello peniale (1); retrattore peniale inserito all'apice del flagello (2); epifallo generalmente più lungo del pene prossimale e con le pareti interne percorse solo da esili pliche longitudinali (3); ghiandola mucosa per lo più vaginale (4); dente centrale della radula con lungo mesocono (5). *O. meridionalis* è una specie di dimensioni piccole – medie, con conchiglia giallognola, talvolta giallo – bruna o verdastra, molto variabile in forma e dimensioni che può essere identificata solo con lo studio anatomico: pene privo di evidente restringimento ("collo di bottiglia") alla fine della porzione prossimale (1); ornamentazione interna del pene prossimale costituita da 5-6 a 13-15 pliche longitudinali, generalmente diritte, qualche volta ondulate o lobate eccetto che attorno all'apertura dell'epifallo dove esiste un sistema di pliche più piccole disposte radialmente e talvolta frammentate in file di più o meno grandi ed evidenti papille) (2).

O. meridionalis ha una storia nomenclaturistica e tassonomica molto complessa a causa del fatto che la sua ampia variabilità, conchiliare ed anatomica, non è stata correttamente interpretata dagli autori del passato. Conseguentemente, è stato citato nella letteratura sotto molti differenti nomi, tre dei quali risultano più giovani sinonimi: *Hyalinia isseliana* Paulucci, *Oxychilus tongiorgii* Giusti, 1969, e *O. forcartianus* Giusti, 1969. Altri nomi applicati erroneamente a questa specie in tempi recenti sono: "*Oxychilus obscuratus*", "*O. porroi*", "*O. alliarius*", "*O.* cf. *draparnaudi*" e "*O.* (cfr.) *uziellii*" (Forcart, 1967, 1968; Giusti, 1969b; Giusti & Mazzini, 1971; Sabelli *et al.*, 1977).

O. meridionalis ha una distribuzione ristretta, circoscritta alla Toscana ed alla Liguria orientale e non sembra essere, al presente, soggetto ad alcuna particolare minaccia.

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INTRODUCTION

Most of the *Oxychilus* taxa of the species group described from Tuscany in the 19th century by Issel (1872), De Stefani (1879, 1883-88), Paulucci (1881, 1882, 1886), and Westerlund (1886) were unrevised until recently (cf. Alzona, 1971).

In late 1950s, L. Forcart published a thorough survey of the Palaeartic zonitid snails in which he proposed a new classification (Forcart, 1957, 1959, 1960) and demonstrated that anatomical study was necessary for correct classification of the oxychiline zonitids. He, subsequently, published two papers on Tuscan *Oxychilus*. In the first he described a new species and revised some classic *Oxychilus* taxa (Forcart, 1967); in the second, devoted to some new field collections, he recorded for Tuscany (Tuscan Archipelago excluded) eight species: *O. (Ortizius) lanzai* n. sp., *O. (Ortizius) obscuratus* (Villa & Villa, 1841), *O. (Ortizius) porroi* (Paulucci, 1882), *O. (Oxychilus) paulucciae* (De Stefani, 1883), *O. (Oxychilus) meridionalis* (Paulucci, 1881), *O. (Oxychilus) isselianus* (Paulucci, 1882), *O. (Oxychilus) draparnaudi* (Beck, 1837) and *O. (Oxychilus) cellarius* (Müller, 1774) (Forcart, 1968). Three other species, *O. (Ortizius) tongiorgii* Giusti, 1969, *O. (Ortizius) forcartianus* Giusti, 1969, and *O. (Ortizius) alliarius* (Miller, 1822) were added a year later by one of us (FG), bringing the number of the *Oxychilus* species in inland Tuscany to eleven (Giusti, 1969a, 1969b).

In the late 1960s, one of us (FG) was involved in studying the malacofauna of the Apuan Alps as a part of a project promoted by the Società Italiana di Biogeografia. He collected much new material and revised the material studied by L. Forcart (1967, 1968). It emerged that Forcart, who studied genital anatomy using diaphanized preparations of the whole distal genitalia, evidently did not realize the enormous variation in internal structure of the proximal penis and flagellum, and since he based his revision on the study of non-topotypical specimens, he misinterpreted some classic species. At this point, Giusti &

Figs. 1-2. Shells of *Oxychilus meridionalis* (Paulucci, 1881) from Fabbriche di Bagni di Lucca (Bagni di Lucca, LU), 32TPP3175, M. Paulucci leg. 9.1877. Lectotype of *Hyalinia meridionalis* (Paulucci collection, Museo Zoologico "La Specola", Sezione del Museo di Storia Naturale dell'Università di Firenze, MZUF no. 13187; Fig. 1) and lectotype of *Hyalinia isseliana* Paulucci, 1882 (Paulucci collection, Museo Zoologico "La Specola", Sezione del Museo di Storia Naturale dell'Università di Firenze, MZUF no. 687; Fig. 2).

MAZZINI (1971) stated that it was necessary to shelve everything and start again.

As a first contribution to the revision of the Tuscan *Oxychilus* species we tackled revision of the oldest established species: *Zonites uziellii* Issel, 1872, (MANGANELLI & GIUSTI, 1985, 1993, 2000). After long preparatory work, we have now revised the most puzzling species: *Hyalinia meridionalis* Paulucci, 1881.

***Oxychilus meridionalis* (Paulucci, 1881)** - Checklist Fauna d'Italia code number: 16.085.0.009.0.

Hyalinia meridionalis PAULUCCI, 1881: 78-79, Pl. 1, fig. 6; PAULUCCI, 1882: Pl. 9, fig. 12.

Type material: in the Paulucci collection there are nine lots of *Hyalinia meridionalis*: one from San Marino, G. Cavanna leg. 7.1878 (MZUF 829/1), one from Avellana, G. Cavanna leg. 1878 (MZUF 830/3), two from Monte Cassino, C. Caroti & M. Paulucci leg. 4.1877 (MZUF 781/12), G. Cavanna leg. 6.1879 (MZUF 832/2), two from Bagni di Lucca, Miss Jones & Mr. Paget leg. 1877 (MZUF 828/7, 13188/5), one from Fabbriche presso i Bagni di Lucca, M. Paulucci leg. 1877 (MZUF 13187/1), one from Camaldoli, C. Caroti leg. 1876 (MZUF

831/1) and one from Palermo, L. Benoit leg. 1877 (MZUF 833/1). All of them, except the latter two (MZUF 831, 833) are from localities listed by PAULUCCI (1881). FORCART (1967) selected MZUF 13187 as the lectotype, possibly because it is the only one which matches the Paulucci's figure (Pl. 1, fig. 6). As for the other type material, only MZUF 828/7, 13188/5 and 831/1 are from localities where *O. meridionalis* lives. Therefore remaining material (MZUF 829/1, 830/3, 781/12, 832/2 and 833/1) belongs to other species.

Type locality: "Abita S. Marino, Avellana nell'Umbria (1878), Monte Cassino in Terra di Lavoro (1879). Già anteriormente io conoscevo questa specie dei Bagni di Lucca, e di Monte Cassino, ove Caroti ed io l'avevamo raccolta nel 1877. Il mio tipo è di Bagni di Lucca perché di questa località dispongo di un più ricco materiale". Following the designation of the lectotype, the type locality becomes "Fabbriche presso i Bagni di Lucca".

Hyalinia Isseliana PAULUCCI, 1882: 165-168, Pl. 9, fig. 13.

Type material: the type series of *Hyalinia isseliana* probably consists of three lots (MZUF 687/1, 688/3, 13346/1). Two of them (MZUF 687, 688) contain an anonymous handwritten label which reads: "*Hyalina Isseliana* Paulucci Fabbriche presso i Bagni di Lucca (Lucca; Toscana) Settembre 1877". MZUF 687 contains three other labels: one by M. Paulucci "H. Isseliana Paulucci. Fabbriche Pr. de Lucques", one by L. Forcart with "Lectotype of *Oxychilus (Oxychilus) isselianus* (Paulucci)" and another by A. Riedel. Likewise, MZUF 688 contains three other labels: one by L. Forcart, "Paralectotypes of *Oxychilus (Oxychilus) isselianus* (Paulucci)" and the other two by F. Giusti and A. Riedel respectively. MZUF 13346 contains four labels: one by L. Forcart (though not signed), "Lectotypus von *Hyalinia isseliana* Paulucci, 1882 ...", one with "Coll. Mus. Firenze 687" written along an edge, one by F. Giusti and two by A. Riedel. In our opinion, these five specimens belong to a same lot, collected at Fabbriche near Bagni di Lucca by M. Paulucci in September 1877. This lot was probably later divided into two (MZUF 687 + 13346 and 688) and a new label with the original data added. Subsequently one specimen of MZUF 687 + 13346 was designated as lectotype by L. Forcart. Forcart added a first label "Lectotypus von *Hyalinia isseliana*..." remarking "synonym mit *Oxychilus (Oxychilus) meridionalis* (Paulucci)?". He subsequently changed his mind, cancelling the note on synonymy and adding a new label "Lectotype of *Oxychilus (Oxychilus) isselianus* (Paulucci)". At this point someone has put one of these two specimens and Forcart's first label in a different box, which was later numbered MZUF 13346. This may explain why there are apparently two lectotypes of *Hyalinia isseliana*. The lectotype designated by L. Forcart is easily recognized as MZUF 687.

Type locality: "Questa specie è molto sparsa in tutta l'Italia centrale e meridionale, conservo bensì per tipo della nuova *Hyalinia* la forma che si rinviene nei dintorni dei Bagni di Lucca ove si potrebbe dire che trovasi il suo centro di sviluppo. La conchiglia figurata proviene infatti da una località denominata le Fabbriche, a poca distanza dai Bagni".

Oxychilus (Ortizius) obscuratus, FORCART, 1967: 116-117, Fig. 2, Pl. 7, fig. 2, non Villa & Villa, 1841.

Oxychilus (Ortizius) porroi, FORCART, 1967: 117 partim, non Paulucci, 1882.

Oxychilus (Ortizius) obscuratus, FORCART, 1968: 87 partim [NMB 5894-a], non Villa & Villa, 1841.

Oxychilus (Ortizius) porroi, FORCART, 1968: 87 [MZUF no number], non Paulucci, 1882.

Oxychilus (Oxychilus) meridionalis, FORCART, 1968: 87 partim [MZUF 697],.

Oxychilus (Ortizius) tongiorgii GIUSTI, 1969a: 367-369, Figs. 1-2, 5A, Pl. 1, figs. 1-2.

Type material: the holotype and 9 paratypes are in the Giusti collection at the Dipartimento di Biologia Evolutiva, Università di Siena (Italy).

Type locality: "Grotta dei Ladri (n. 262 T. Pi) Monti Pisani nei pressi di Asciano".

Oxychilus (Ortizius) forcartianus GIUSTI, 1969a: 369-371, Figs. 3-4, 5B, Pl. 1, figs. 3-4.

Type material: the holotype and 3 paratypes are in the Giusti collection at the Dipartimento di Biologia Evolutiva, Università di Siena (Italy).

Type locality: "Grotta dei Fiorentini presso Pomarance (Grosseto)".

Oxychilus (Ortizius) alliarius, GIUSTI, 1969b: Figs. 1-2, Pl. 1, figs. 1-3, non Miller, 1822.

Oxychilus (s.str.) cf. *meridionalis*, GIUSTI & MAZZINI, 1971: 261-262.

Oxychilus (s.str.) cf. *draparnaudi*, GIUSTI & MAZZINI, 1971: 262-263, non Beck, 1837.

Oxychilus (cfr.) *uzielli* [sic], SABELLI *et al.*, 1977: 121-122, Fig. 1, Pl. 2, figs. 3a-3d, non Issel, 1872.

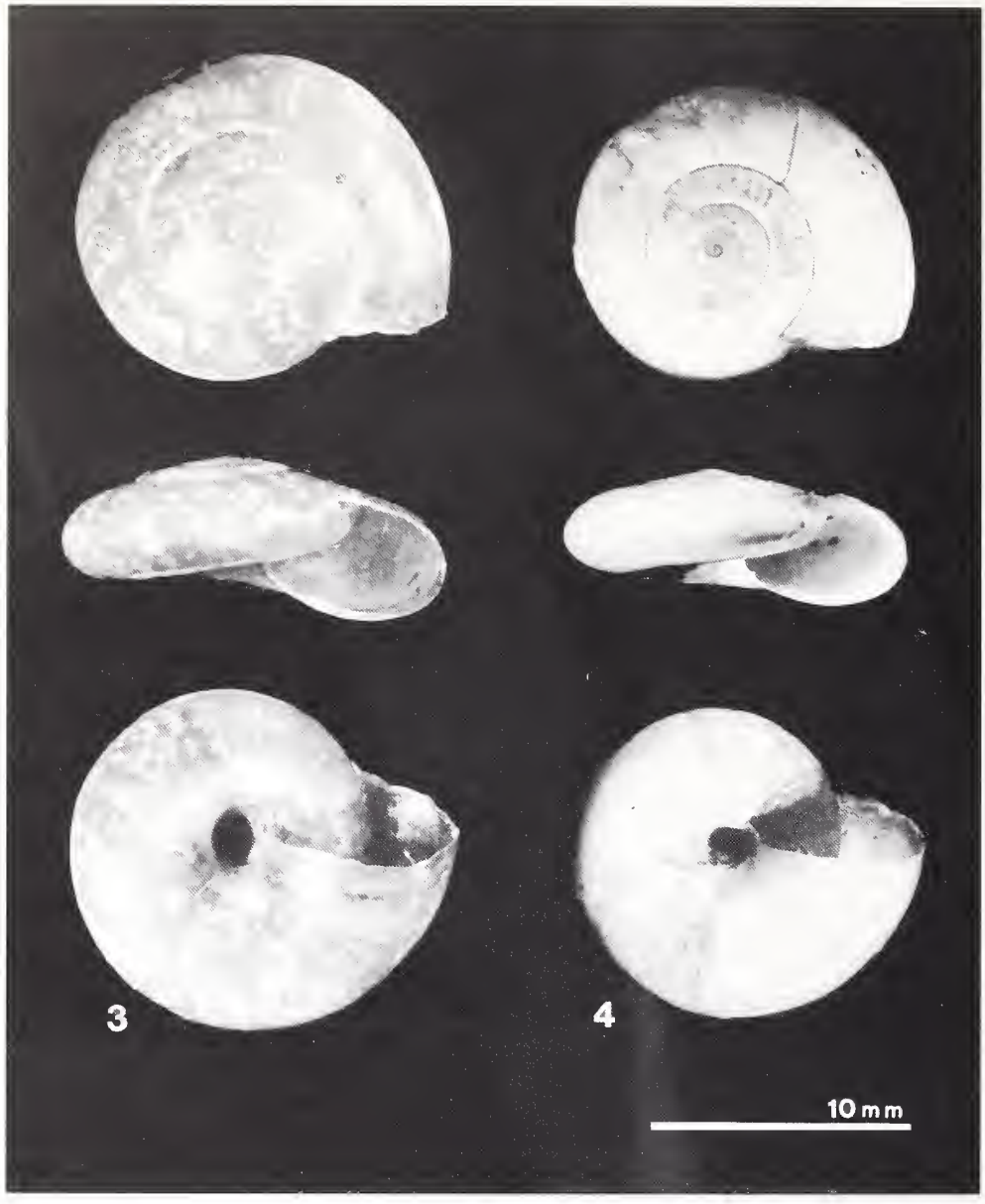
IDENTIFICATION

A small to medium species of *Oxychilus* (s.str.) sensu GIUSTI & MANGANELLI (1999) with shell very variable in shape, glossy and yellowish to pale brownish or greenish yellow, with about 5-6 regularly growing whorls. *O. meridionalis* can only be identified by anatomical characters: penis without clear distinction into proximal and distal parts ("bottle-neck" portion of proximal penis absent) (1), and distinctive internal ornamentation of penis and flagellum (5-6 to 13-15 longitudinal pleats, usually straight, sometimes wavy or lobate except around epiphallus opening into penis where there is a system of small pleats, radially disposed, sometimes fragmented into rows of variably large papillae) (2).

DESCRIPTION

Body slate blue in colour; neck and upper part of sides with variably wide areas with pits (with phylacites); foot slender, of aulacopod type, pale slate-gray, with sole longitudinally tripartite; kidney sigmurethrous; jaw oxygnathous. This species may emit a garlic-like smell when disturbed.

Shell (Figs. 1-8, Table 1; GIUSTI, 1969a: 367, Pl. 1, figs. 1-2 [*Oxychilus (Ortizius) tongiorgii*]; 369, Pl. 1, figs. 3-4 [*Oxychilus (Ortizius) forcartianus*]; GIUSTI, 1969b: 375, Pl. 1, figs. 1-3 [*Oxychilus (Ortizius) alliarius*]) dextral, small to medium in size,



Figs. 3-4. Shells of *Oxychilus meridionalis* (Paulucci, 1881) from Grotta dei Fiorentini (Castelnuovo Val di Cecina, PI), 32TPN5891, A. Sassi leg. 16.9.66 (holotype of *Oxychilus forcartianus* Giusti, 1969a; Giusti collection; Fig. 3) and Buca dei Ladri 262 T/PI (San Giuliano Terme, PI), 32TPP14, P. Tongiorgi & M. Riccucci leg. 15.7.67 (holotype of *Oxychilus tongiorgii* Giusti, 1969a; Fig. 4)

discoidal, usually tectiform, sometimes depressed, round below, thin, subtransparent, variably glossy, yellowish to pale brownish-yellow or greenish in colour, sometimes with paler spiral bands or lines and opalescent below; surface rather smooth, with variably evident growth lines and microsculpture consisting of very fine wavy spiral lines; spire of 4 3/4 - 6 1/12 whorls, rather slowly and regularly increasing in size, last whorl dilated near aperture, its last quarter descending to some extent, rarely slightly angled at periphery; sutures shallow; umbilicus small, wide about 1.3 - 3.0 mm (usually 1/6 - 1/7, rarely 1/4 - 1/5 and in only one case 1/9 of maximum shell diameter), sometimes eccentric; aperture oval, oblique; peristome interrupted, simple, not thickened nor reflected, its superior vertex starting at or slightly above periphery of last whorl.

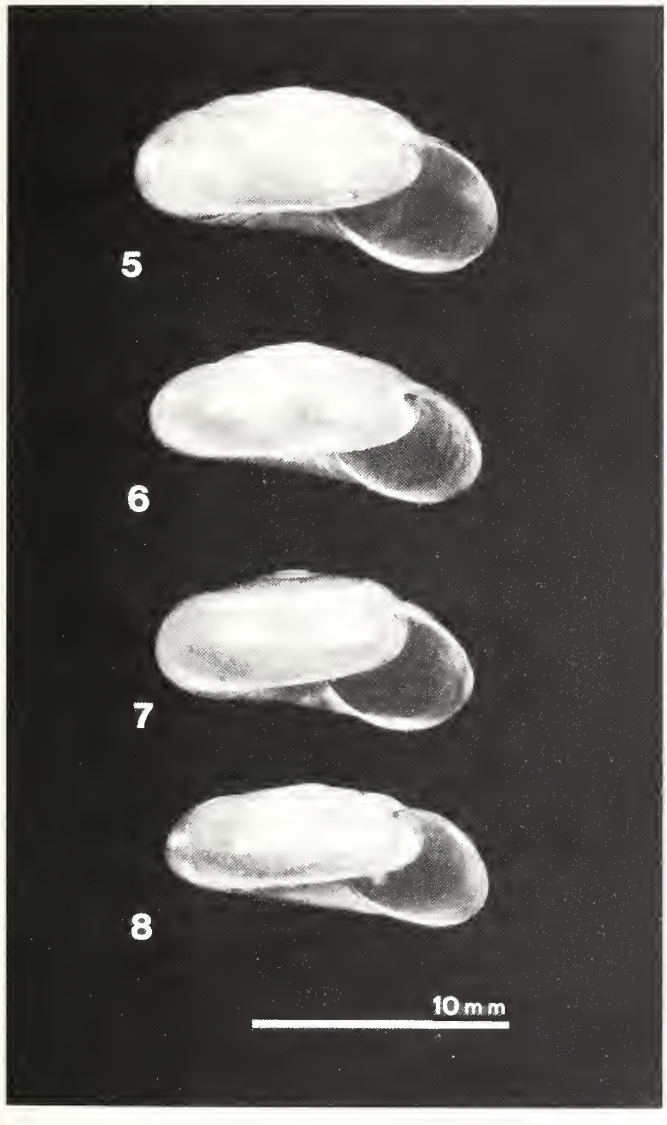
Dimensions (65 shells measured). Number of whorls: 5 3/7 ± 2/7 (4 3/4 - 6 1/12); shell diameter: 13.1 ± 2.0 mm (8.9 - 16.6); height: 5.5 ± 0.8 mm (3.6 - 7.4); umbilicus diameter: 2.2. ± 0.4 mm (1.3 - 3.0).

Genitalia (Figs. 9-31 , Tables 2-3; GIUSTI, 1969a: Fig. 1 [*Oxychilus (Ortizius) tongiorgii*], Fig. 3 [*Oxychilus (Ortizius) forcartianus*]; GIUSTI, 1969b: Fig. 1 [*Oxychilus (Ortizius) alliarius*]).

General scheme of genitalia as in *Oxychilus* (s.str.) sensu GIUSTI & MANGANELLI (1999). Only distal genitalia are described here. Female genitalia include free oviduct, bursa copulatrix

and its duct, and vagina. Distal portion of duct of bursa copulatrix and of free oviduct and proximal 1/4 - 1/3 of vagina enveloped by variably large and long muff of spongy glandular tissue forming vaginal gland; duct of bursa copulatrix variably long (2.3 - 6.3 mm; n: 26), initially moderately flared, narrowing before entering oval or pyriform bursa copulatrix; distal vagina (that without glandular muff) variably long (1.1 - 4.0 mm; n: 26) and wide, not or slightly reducing in calibre near genital atrium.

Male distal genitalia include vas deferens, epiphallus and penial complex (flagellum and penis). Epiphallus variably long (3.7 - 7.8 mm; n: 26) and slender, internal walls bearing series of very slender longitudinal pleats. Flagellum rather short (1.0 - 2.8 mm; n: 26), with penial retractor muscle ending at apex. Penis variably long (4.1 - 11.6 mm; n: 26) without clear distinction into proximal and distal parts on the outside or inside. "Bottle-neck" (terminal, very slender part of proximal penis, enveloped by thin, distinct, subtransparent sheath, immediately preceding distal penis in some *Oxychilus* s.str. species; see GIUSTI & MANGANELLI, 1997; MANGANELLI & GIUSTI, 1998) absent; only in few cases, border between proximal and distal penis indicated externally by indistinct constriction and thin sheath. Internal pleats of "proximal" penis continuous with those of distal penis without interruption (point at which distal penis begins is sometimes marked by fact that pleats become wider and have more jagged sides). Penis usually wider at its beginning (level with beginning of proximal penis), then slightly reduced in caliber (level with end of proximal penis). Internal surface of flagellum and proximal penis surrounding opening of epiphallus into penis with small, radially disposed pleats, sometimes fragmented into rows of variably large papilla-like structures; surface opposite opening of epiphallus into penis with slender longitudinal pleats, usually straight, sometimes wavy, with jagged sides or lobate as if derived from row of fused papillae. Variable number (5-6 to 13-15) of these pleats continue on remaining proximal penis, converging, fusing and reducing in number before continuing without interruption inside distal penis, where they usually become wider and have jagged sides. Distal penis enveloped by rather short (0.8 - 2.9 mm; n: 26) penial sheath, initially very thin, traversed on one side by vas deferens, then slightly thickened for rest of length. Very short, thin walled duct connects distal penis (level with where penial sheath originates) to genital atrium in which vagina also ends.



Figs. 5-8. Shells of *Oxychilus meridionalis* (Paulucci, 1881) from Torrente Arbia, Balze di Caspreno (Castelnuovo Berardenga, SI), 32TPP9601, G. Manganelli leg. 8.4.82 (Fig. 5), Pastine di Sotto (Siena, SI), 32TPN8198, L. Favilli leg. 15.2.90 (Fig. 6), Torrente Arbia, Taverne d'Arbia (Siena, SI), 32TPN9496, G. Manganelli leg. 30.1.82 (Fig. 7) and Alpi Apuane, Monte Altissimo, q. 1100-1200 m (Stazzema, LU), 32TNP97, F. Giusti leg. 26.9.69 (Fig. 8).

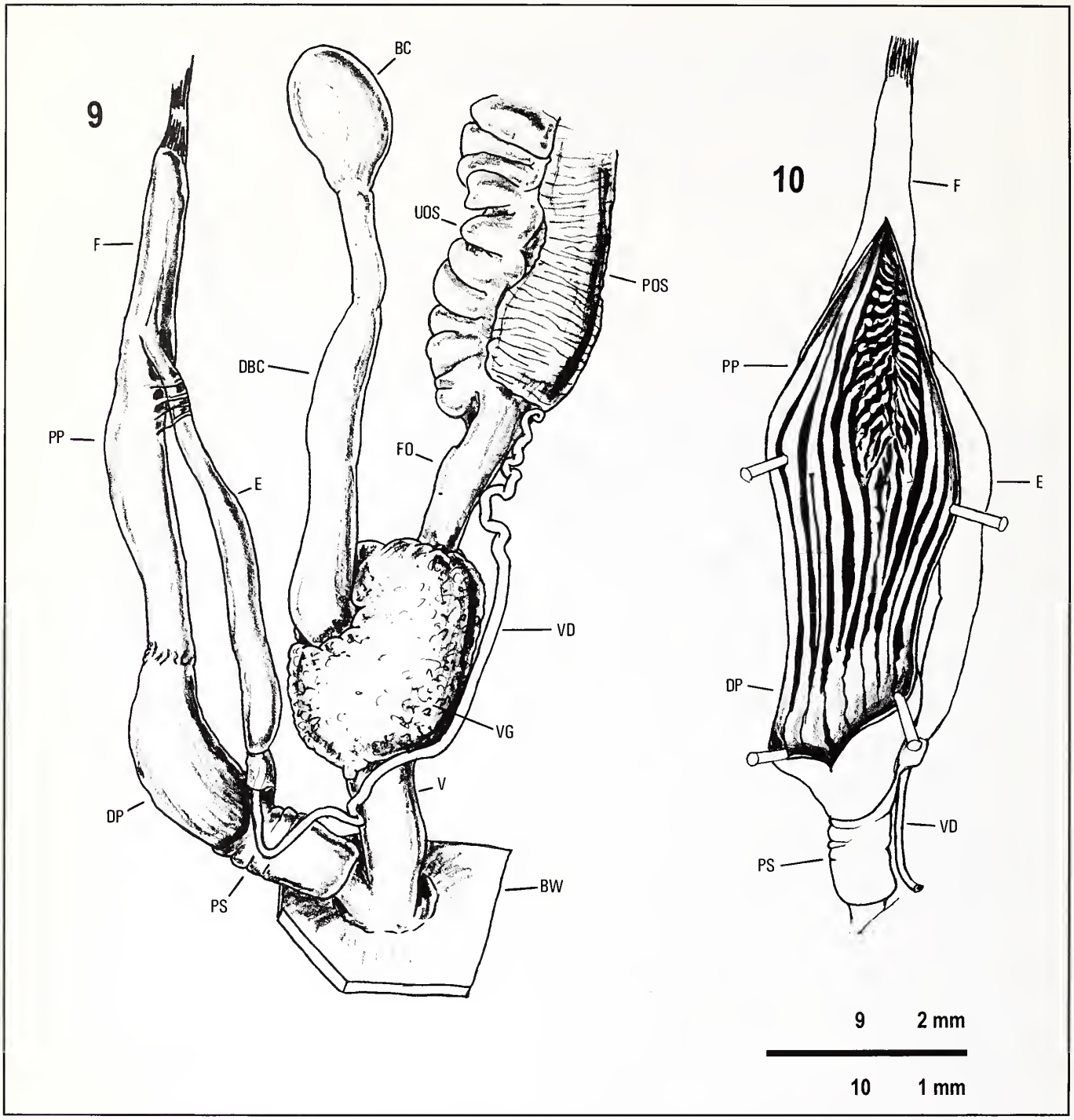
Radula (GIUSTI, 1969a: Fig. 2 [*Oxychilus (Ortizius) tongiorgii*], Fig. 4 [*Oxychilus (Ortizius) forcartianus*]; GIUSTI, 1969b: Fig. 2 [*Oxychilus (Ortizius) alliarius*]) consisting of many rows of about 29-35 teeth, according to the formula: 11-14 M/1 + 0-1 LM/2 + 2-3 L/3 + C/3 + 2-3 L/3 + 0-1 LM/2 + 11-14 M/1. Central teeth with well developed basal plate, apical portion of which V-like, with pointed vertices; body of tooth wide, providing base for long, slender, pointed mesocone flanked by two very short ectocones. On both sides of each central tooth two-three lateral tricuspid teeth, sometimes one latero-marginal bicuspid tooth and series of monocuspid marginal teeth in decreasing order of size.

TYPE MATERIAL AND TYPE LOCALITIES

Most information about the type material and type localities of the nominal taxa is given under the synonymy. It is interesting to remark that the type localities of *Hyalinia meridionalis* and *H. isseliana* coincide. A detailed description of the place where these materials, first determined as *H. obscurata*, were found is given by PAULUCCI (1878).

MATERIAL EXAMINED

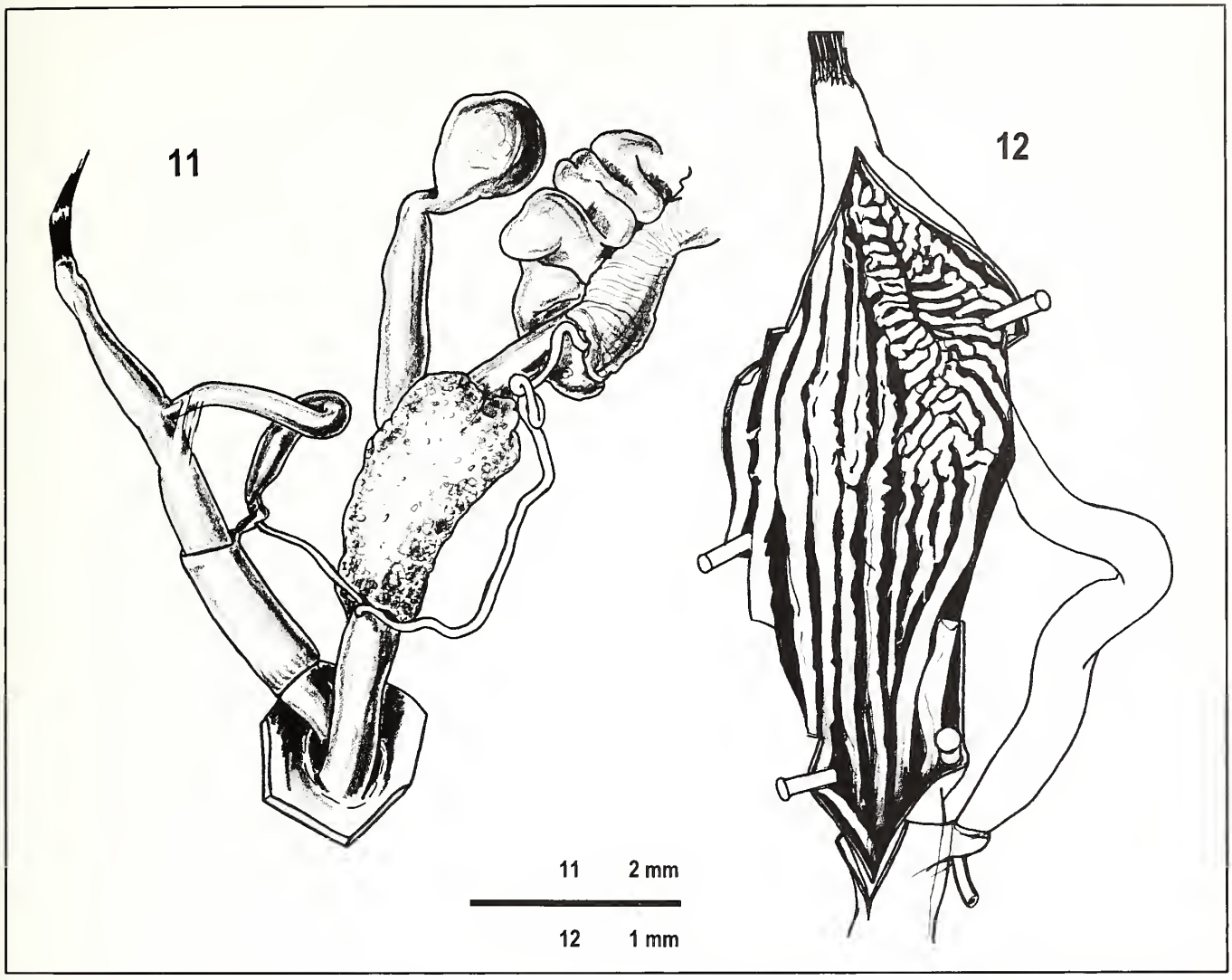
All the material belongs to populations anatomically determined. The material examined is listed as follows: locality, municipality and province names in parenthesis, UTM referen-



Figs. 9-10. Distal genitalia (Fig. 9) and internal ornamentation of flagellum and proximal penis (Fig. 10) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Fabbriche di Bagni di Lucca, along Borro Legara (Bagni di Lucca, LU), 32TPP3175, S. Cianfanelli & G. Manganelli leg. 31.10.98.
Key to the acronyms used in Figs. 10-31: BC bursa copulatrix, BW body wall, DBC duct of bursa copulatrix, DP distal portion of penis, E epiphallus, FO free oviduct, P penis, POS prostatic portion of ovispermiduct, PP proximal portion of penis, PR penial retractor, PS penial sheath, UOS uterine portion of ovispermiduct, VD vas deferens, VG vaginal gland.

ce, collector(s), date, number of specimens (if the material has been sorted) and bibliographical reference, in parenthesis if they are voucher specimens. Locality names and UTM references are according to the official 1:25,000 scale map of Italy (series M 891). Unless otherwise indicated, all the material examined is kept in the Giusti Collection (Dipartimento di Biologia Evolutiva, Via Mattioli 4, I-53100 Siena, Italy).

Acronyms. Collectors: AA A. Arrighi, AB A. Baldan, AS A. Sassi, BL B. Lanza, BS B. Sabelli, CV C. Volpi, FG F. Giusti, GC G. Comotti, GL G. Lazzari, GLr G. Lazzeroni, GM G. Manganelli, GS G. Sammuri, IS I. Scali, LB L. Borri, LBg L. Briganti, LF L. Favilli, LFr L. Forcart, MB M. Bodon,

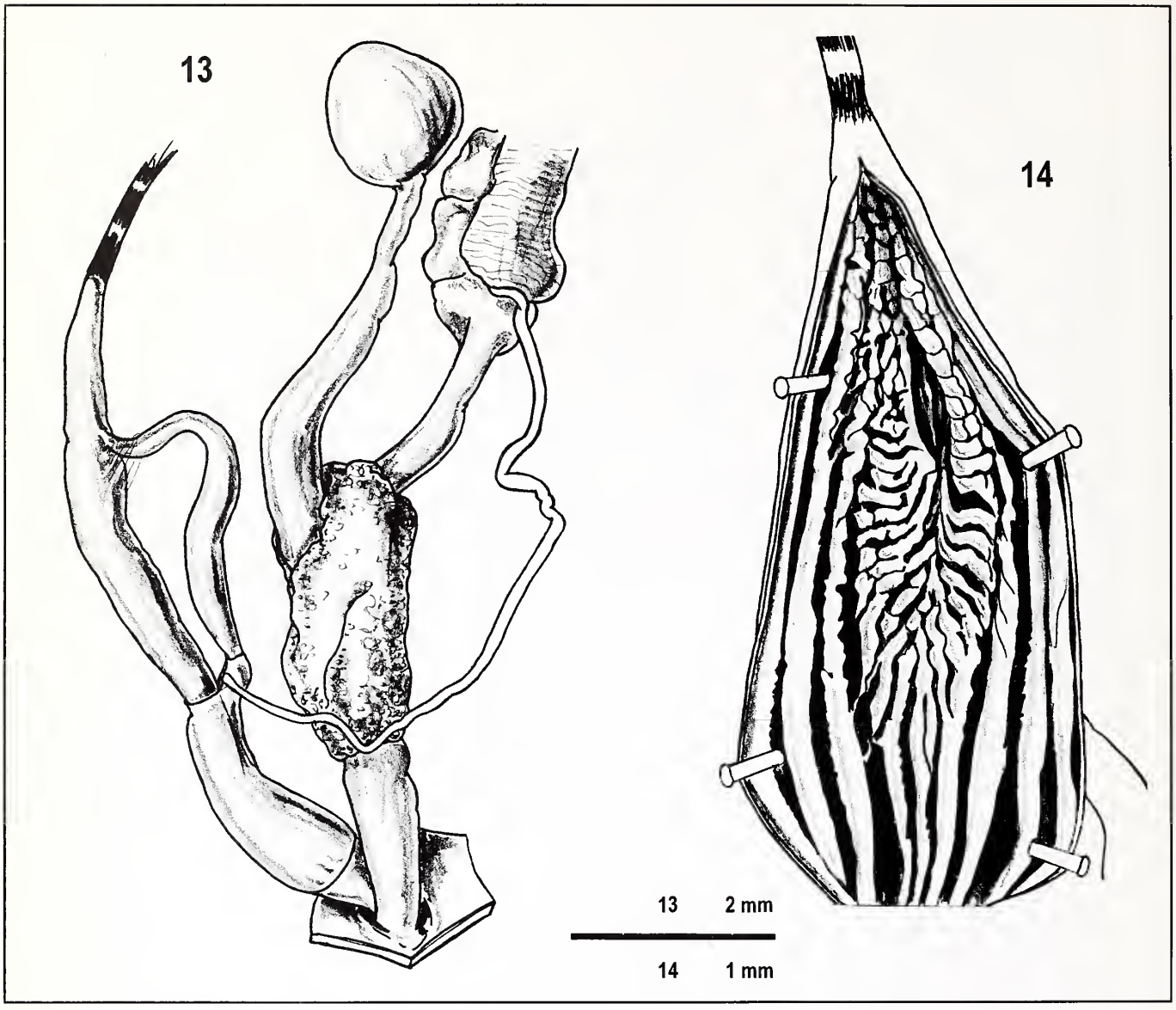


Figs. 11-12. Distal genitalia (Fig. 11) and internal ornamentation of flagellum and proximal penis (Fig. 12) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Bagni di Lucca (Bagni di Lucca, LU), 32TPP2574, B. Sabelli leg. 4.2.76.

MC M. Calcagno, MP M. Paulucci, MR M. Riccucci, PT P. Tongiorgi, SC S. Cianfanelli, SZ S. Zoia. Provinces: GR Grosseto, LU Lucca, MS Massa Carrara, PI Pisa, SI Siena, SP La Spezia. Materials: sh shell/s, sp spirit specimen/s. Museum and private collections: MBC M. Bodon collection, via delle Eriche 100/8, 14148 Genova, Italy, MZUF Museo Zoologico "La Specola", Sezione del Museo di Storia Naturale dell'Università di Firenze, Via Romana 17, 50125 Firenze, Italy, NMB Naturhistorisches Museum Basel, SCC S. Cianfanelli collection, P.le Porta Romana 13, 50125 Firenze, Italy.

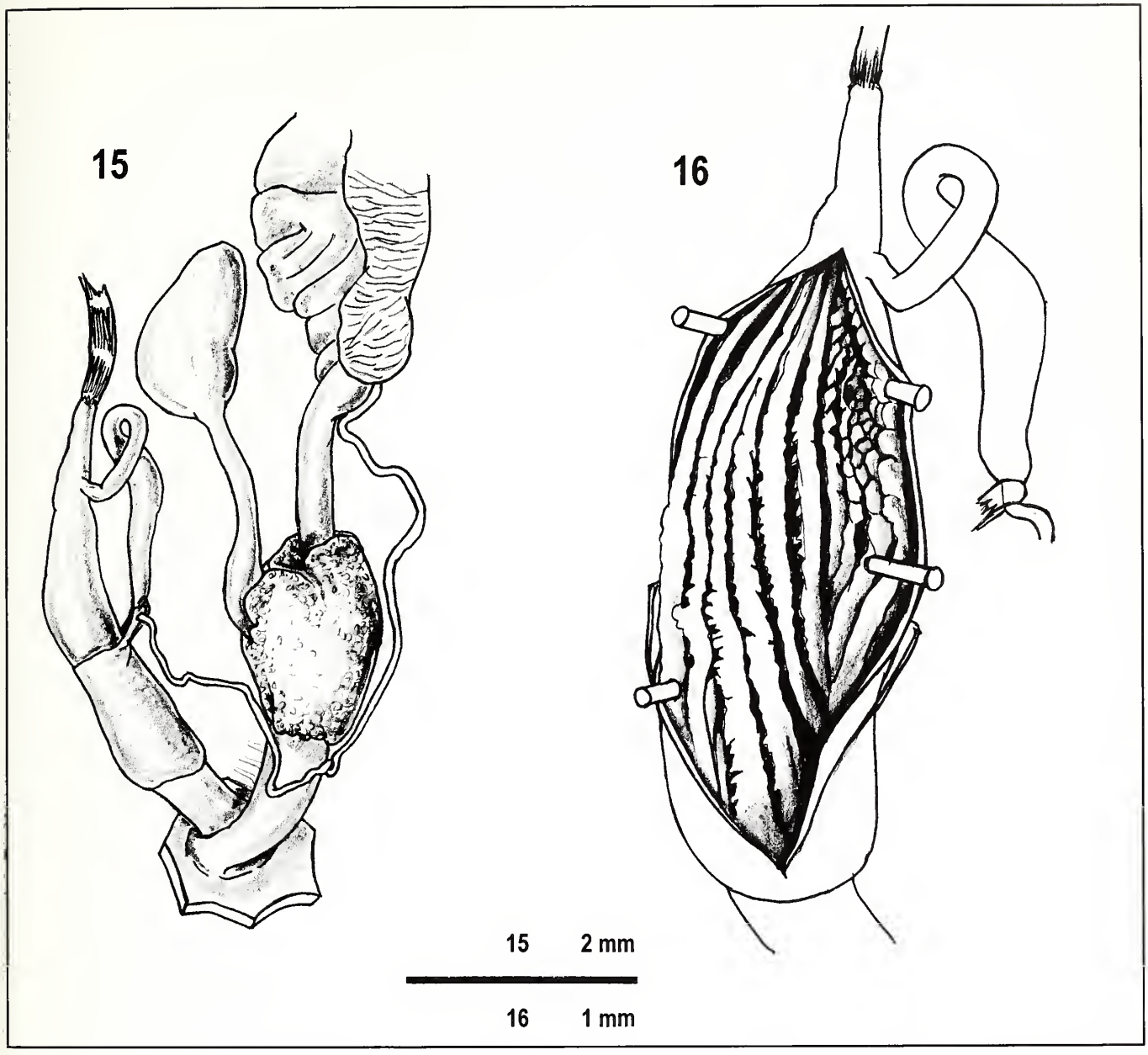
Liguria: **NP78)** Casamatta di Monte Branzi 519 Li/Sp (Lerici, SP), 32TNP7481, LBg & SZ leg. 5.11.79 (3 sp).

Tuscany: **NP89)** Olivola (Aulla, MS), 32TNP8197, LFr leg. 24.5.48 (1 sp, NMB 5894-a; FORCART, 1967, 1968, as *Oxychilus obscuratus*). **NP97)** Alpi Apuane, Monte Altissimo, q. 1100-1200 m (Stazzema, LU), 32TNP97, FG leg. 26.9.69 (3 sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). Alpi Apuane, Monte Altissimo, q. 1300 m (Stazzema, LU), 32TNP97, FG leg. 26.9.69 (1 sh, 1 sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). Alpi Apuane, Monte Altissimo, q. 1400-1500 m (Stazzema, LU), 32TNP97, FG leg. 26.9.69 (1 sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). **NP98)** Alpi Apuane, Bedizzano (Massa Carrara, MS), 32TNP9081, IS leg. 11.89 (5 sp). **PN56** Buca del Frate di Perolla 489 T/GR (Massa Marittima, GR), 32TPN5967, GS & LB leg. 4.4.76 (1 sp). **PN59** Grotta dei Fiorentini (Castelnuovo Val di Cecina, PI), 32TPN5891, AS leg. 16.9.66 (holotype [sh and genital duct] and 3 paratypes [1 sh, 2 sp] of *Oxychilus forcartianus* Giusti, 1969a). **PN89** Pastine di Sotto (Siena, SI), 32TPN8198, LF leg. 27.1.90 (2 sh), LF leg. 15.2.90 (2 sp).



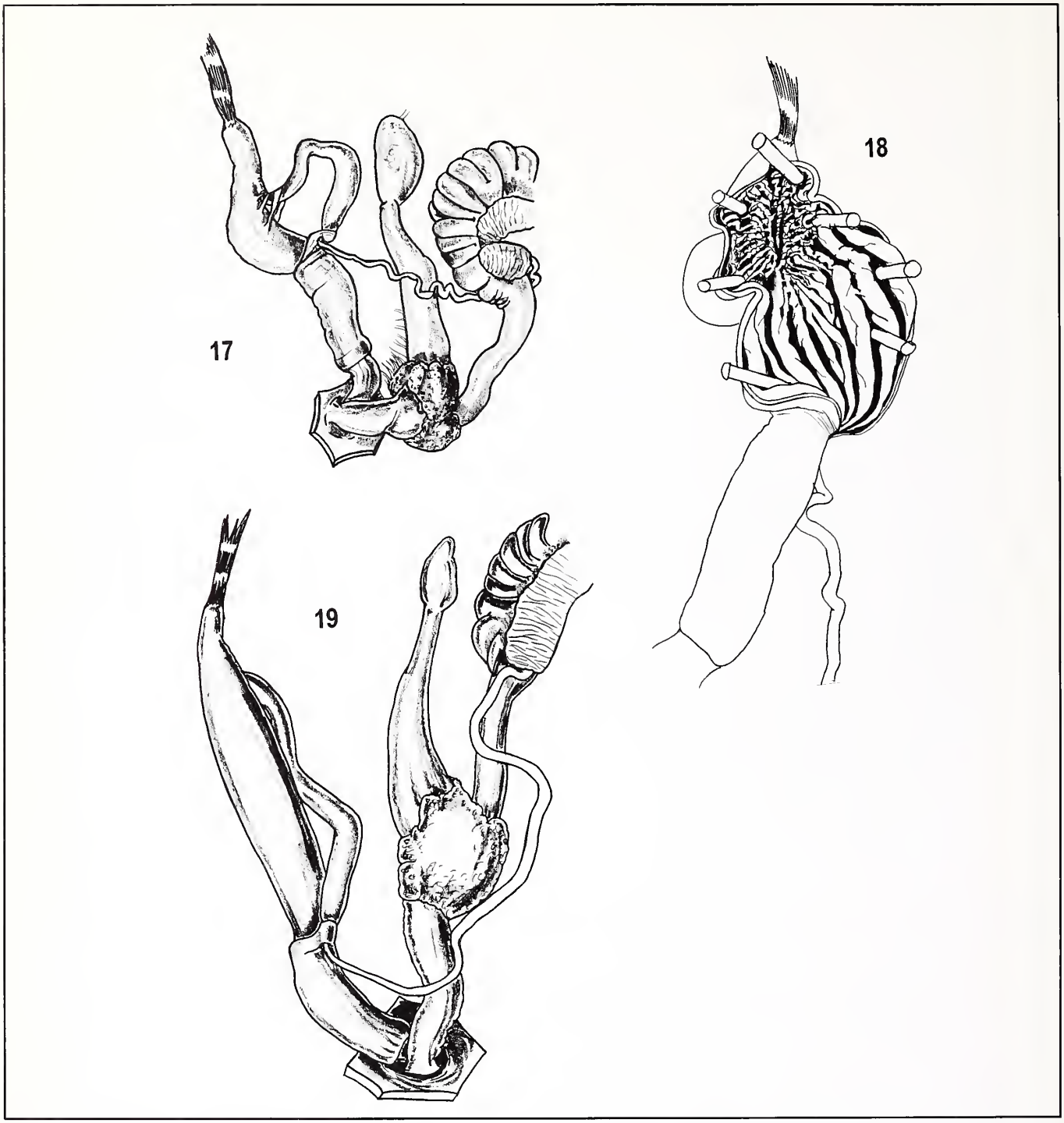
Figs. 13-14. Distal genitalia (Fig. 13) and internal ornamentation of flagellum and proximal penis (Fig. 14) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Bagni di Lucca (Bagni di Lucca, LU), 32TPP2574, B. Sabelli leg. 28.3.74.

PN99 Torrente Arbia, Taverne d'Arbia (Siena, SI), 32TPN9496, GM leg. 30.1.82 (4 sp), GM leg. 12.3.82 (1 sp). **PP04** Tenuta di San Rossore, Gombo (Pisa, PI), 32TPP0341, FG & GM leg. 22.12.82 (numerous sh, numerous sp). **PP05** Torre del Lago Puccini (Viareggio, LU), 32TPP0453, MB, leg. 8.3.80 (1 sp). **PP06** Montramito (Massarosa, LU), 32TPP0460, MB, leg. 8.3.80 (1 sp, MBC). **PP07** Alpi Apuane, Grotta della Risvolta 158T/LU (Stazzema, LU), 32TPP0372, MB & SC leg. 9.11.97 (5 sp, SCC). Alpi Apuane, Levigliani (Stazzema, LU), 32TPP0275, FG leg. 23.3.70 (1 sh, numerous sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*), FG leg. 23.10.80 (2 sh, 2 sp), FG & GM, leg. 28.6.83 (5 sh, 2 sp). Alpi Apuane, Monte Forato, q. 450 m (Stazzema, LU), 32TPP07, FG leg. 16.6.70 (5 sh, numerous sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). Alpi Apuane, Monte Forato, q. 700 m (Stazzema, LU), 32TPP07, FG leg. 16.6.70 (numerous sh, numerous sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). Alpi Apuane, Monte Freddone, q. 800 m (Stazzema, LU), 32TPP07, FG leg. 29.10.69 (1 sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). Alpi Apuane, Monte Freddone, q. 1000 m (Stazzema, LU), 32TPP07, GLr leg. 29.10.69 (numerous sh, numerous sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). Alpi Apuane, Monte Pania della Croce, q. 1100 m (Stazzema, LU), 32TPP07, FG leg. 24.9.69 (3 sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *draparnaudi*). Alpi Apuane, Monte Pania della Croce, q. 1200 m (Stazzema, LU), 32TPP07, FG leg. 24.9.69 (1 sh, 4 sp). Alpi Apuane, Monte Pania della Croce, q. 1850 m (Stazzema, LU),



Figs. 15-16. Distal genitalia (Fig. 15) and internal ornamentation of flagellum and proximal penis (Fig. 16) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Buca dei Ladri 262 T/PI (San Giuliano Terme, PI), 32TPP14, P. Tongiorgi & M. Riccucci leg. 15.7.67 (paratype of *Oxychilus tongiorgii* Giusti, 1969a).

32TPP07, FG leg. 24.9.69 (1 sp). Alpi Apuane, Rifugio Forte dei Marmi (Stazzema, LU), 32TPP0772, IS leg. 13.5.90 (1 sp). Alpi Apuane, Tanella del Cipollaio 223T/LU (Seravezza, LU), 32TPP0178, BL 23.7.61 (1 sp, MZUF no number; Forcart, 1967, 1968, as *Oxychilus porroi*; 4 sh, MZUF 697; Forcart, 1968, as *Oxychilus meridionalis*), BL leg. 7.8.96 (2 sp, MZUF 15857). PP08 Alpi Apuane, cima del Monte Fiocca (Vagli, LU), 32TPP08, FG leg. 9.70 (1 sp; GIUSTI & MAZZINI, 1971, as *Oxychilus* cf. *meridionalis*). PP14 Buca dei Ladri 262 T/PI (San Giuliano Terme, PI), 32TPP14, PT & MR leg. 15.7.67 (holotype [sh and genital duct] and 9 paratypes [2 sh, 7 sp] of *Oxychilus tongiorgii* Giusti, 1969a), MR leg. 30.11.69 (5 sh). Grotta delle Fate di Cima la Sugheretta (San Giuliano Terme, PI), GC & AB leg. 11.7.85 (numerous sp). PP15 Grotta di Parignana 69 T/PI (San Giuliano Terme, PI), GC & AB leg. 15.7.85 (numerous sh, 5 sp). Tana del Paduletto 243-244 T/PI (Vecchiano, PI), 32TPP1150, MB leg. 27.12.82 (3 sp). PP17 Fabbriche di Vallico (Fabbriche di Vallico, LU), 32TPP1472, MB, leg. 6.5.80 (1 sp, MBC). PP19 Sassorosso (Villa Collemandina, LU), 32TPP19, MB, leg. 6.5.80 (3 sh, 1 sp, MBC). PP27 Bagni di Lucca (Bagni di Lucca, LU), 32TPP2574, BS leg. 12.4.73 (3 sp; SABELLI *et al.*, 1977, as *Oxychilus* (cfr.) *uzielli*



Figs. 17-19. Distal genitalia (Figs. 17, 19) and internal ornamentation of flagellum and proximal penis (Fig. 18) in specimens of *Oxychilus meridionalis* (Paulucci, 1881) from Grotta dei Fiorentini (Castelnuovo Val di Cecina, PI), 32TPN5891, A. Sassi leg. 16.9.66 (paratype of *Oxychilus forcartianus* Giusti, 1969a) (Figs. 17-18) and Poggio del Comune (San Gimignano, SI), 32TPP6113, G. Manganelli leg. 7.10.82 (Fig. 19).

[sic]), BS leg. 28.3.74 (1 sp; SABELLI *et al.*, 1977, as *Oxychilus* (cfr.) *uzielli* [sic]), BS leg. 4.2.76 (5 sp; SABELLI *et al.*, 1977, as *Oxychilus* (cfr.) *uzielli* [sic]). Bagni di Lucca, Ponte del Diavolo (Bagni di Lucca, LU), 32TPP2674, BS leg. 10.11.72 (3 sp; SABELLI *et al.*, 1977, as *Oxychilus* (cfr.) *uzielli* [sic]). **PP37** Fabbriche di Bagni di Lucca (Bagni di Lucca, LU), 32TPP3175, MP leg. 9.1877 (6 sh [lectotype of *Hyalinia meridionalis* Paulucci, 1881; Paulucci collection, Museo Zoologico "La Specola", Sezione del Museo di Storia Naturale dell'Università di Firenze, MZUF no. 13187; lectotype and four paralectotypes of *Hyalinia isseliana* Paulucci, 1882; Paulucci collection, Museo Zoologico "La Specola", Sezione del Museo di Storia Naturale dell'Univer-

Locality	SD	H	UD	WN	N
Alpi Apuane, Monte Altissimo, q. 1100-1200 m, F. Giusti leg. 26.9.69	11.3	4.6	2.1	5 1/8	1
Alpi Apuane, Monte Altissimo, q. 1400-1500 m, F. Giusti leg. 26.9.69	16.3	6.5	2.9	5 2/3	1
Tenuta di San Rossore, Gombo, F. Giusti & G. Manganelli leg. 22.12.82	12.3 ± 1.2 (10.8 – 14.3)	5.4 ± 0.5 (4.8 – 6.2)	2.0 ± 0.3 (1.5 – 2.4)	5 1/3 ± 1/5 (5 1/12 – 5 2/3)	10
Alpi Apuane, Levigliani, F. Giusti leg. 23.10.80	14.7 – 16.5	5.9 - 6.3	2.2 -2.8	5 7/8 – 6	3
Alpi Apuane, Levigliani, F. Giusti & G. Manganelli, leg. 28.6.83	15.8 ± 0.7 (15.0 – 16.6)	6.2 ± 0.3 (6.0 – 6.6)	2.2 ± 0.4 (1.8 – 2.6)	5 2/3 ± 2/7 5 1/4 – 5 7/8	4
Alpi Apuane, Monte Forato, q. 450, F. Giusti leg. 16.6.70	13.6 ± 1.7 (12.4 – 16.6)	5.3 ± 0.5 (4.5 – 5.9)	2.3 ± 0.2 (2.0 – 2.5)	5 1/12 ± 1/9 (5 1/3 – 5 5/8)	5
Alpi Apuane, Monte Forato, q. 700 m, F. Giusti leg. 16.6.70	13.4 ± 0.6 (12.8 – 14.0)	5.3 ± 0.3 (4.9 – 5.6)	2.3 ± 0.4 (2.1 – 2.8)	5 5/8 ± 2/9 (5 3/8 – 5 7/8)	4
Alpi Apuane, Monte Pania della Croce, q. 1100 m, F. Giusti leg. 24.9.69	9.0 – 9.1	3.6 – 3.8	1.3 – 1.4	5 1/12 – 5 1/6	3
Bagni di Lucca, Ponte del Diavolo, B. Sabelli leg. 10.11.72	11.4 – 12.1	4.6 – 5.1	1.9 – 2.1	5 3/8	2
Bagni di Lucca, B. Sabelli leg. 28.3.74	16.6	6.6	3.0	5 3/4	1
Bagni di Lucca, B. Sabelli leg. 4.2.76	13.2 ± 1.8 (11.9 – 15.6)	4.8 ± 0.4 (4.3 – 5.4	2.1 ± 0.4 (1.8 – 2.6)	5 1/17 ± 1/6 (5 – 5 3/8)	4
Bagni di Lucca , B. Sabelli leg. 12.4.73	13.0 – 16.0	4.8 – 6.1	1.9 – 2.1	5 1/8 – 5 3/4	2
Fabbriche di Bagni di Lucca, along Borro Legara, S. Cianfanelli & G. Manganelli leg. 31.10.98	15.5 ± 0.7 (14.4 – 16.1)	6.0 ± 0.9 (5.3 – 7.4)	2.5 ± 0.1 (2.4 – 2.8)	5 2/5 ± 2/5 (5 1/12 – 6 1/12)	5
Poggio del Comune, G. Manganelli leg. 7.10.82	13.1 ± 1.2 (11.9 – 14.7)	6.2 ± 0.4 (5.8 – 6.8)	2.4 ± 0.3 (2.1 – 2.8)	5 1/2 ± 1/4 (5 3/4 – 5 7/8)	7
Capanno, G. Manganelli leg. 25.4.83	12.5 ± 1.1 (10.6 – 14.1)	5.5 ± 0.7 (4.8 – 7.0)	2.3 ± 0.7 (4.8 – 7.0)	5 1/4 ± 1/5 (5 1/8 – 5 5/6)	10
Passo La Calla, F. Giusti leg. 22.6.68	9.3 – 11.0	4.2 – 5.4	1.9 – 2.3	4 3/4 – 5 1/2	3
All the specimens	13 ± 2.0 (8.9 – 16.6)	5.5 ± 0.8 (3.6 – 7.4)	2.2 ± 0.4 (1.3 – 3.0)	5 3/7 ± 1/12 (4 3/4 – 6 1/12)	65

Table 1. Dimensions and number of whorls of shell of *Oxychilus meridionalis* (Paulucci, 1881) (mean, standard deviation above and range below). For details of localities, see Material examined. SD shell diameter, H shell height, UD umbilicus diameter, WN whorl number, N number of specimens.

sità di Firenze, MZUF no. 687, 688, 13346]; Paulucci, 1878, 1881, 1882, Fabbriche di Bagni di Lucca, along Borro Legara (Bagni di Lucca, LU), 32TPP3175, SC & GM leg. 31.10.98 (7 sh, 5 sp). **PP61** Montauto (San Gimignano, SI), 32TPP6611, GM leg. 28.12.83 (1 sp). Poggio del Comune (San Gimignano, SI), 32TPP6113, GM leg. 7.10.82 (numerous sh, 4 sp). **PP90** Capanno (Castelnuovo Berardenga, SI), 32TPP9308, GM leg. 25.4.83 (5 sp). Torrente Arbia, Balze di Caspreno (Castelnuovo Berardenga, SI), 32TPP9601, GM leg. 8.4.82 (1 sp), GM leg. 28.2.86 (2 sp), GM leg. 11.88 (1 sp). **QP05** Torrente Uscioli (Pontassieve, FI), 32TQP0059, SC, MC, CV & AA leg. 11.4.99 (2 sp; SCC). **QP25** Sacro Eremo di Camaldoli (Poppi, AR), 32TQP2654, GM & LF leg. 15.7.90 (1 sh, 3 sp). Poggio di Pian Tombesi, q. 1520 m (Pratovecchio, AR), GL leg. 10.9.87 (1 sp). **QP26** Passo La Calla (Stia, AR), 32TQP2060, FG leg. 22.6.68 (numerous sh, numerous sp; Giusti, 1969b, *Oxychilus alliarius*), FG leg. 19.6.71 (5 sh, 2 sp).

ETYMOLOGY

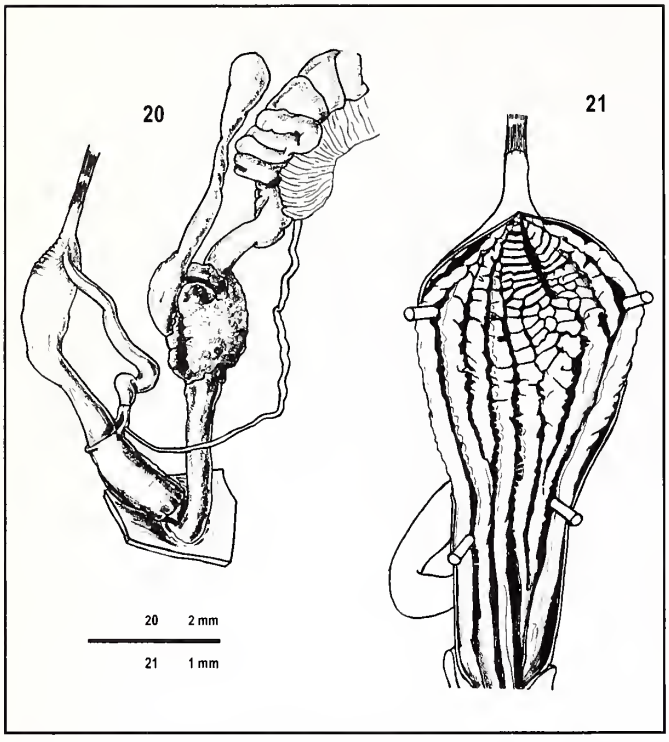
Paulucci (1881) did not explan why she named her species "*meridionalis*" (i.e. "southern"). However the name presumably indicated that the species, as conceived by Paulucci, was widespread in central and southern Italy (Paulucci, 1882: 166).

The other species described by Paulucci, *Hyalinia isseliana*, was named after Arturo Issel (1842-1922), a well-known Italian geologist who had an interest in malacology (Sacco, 1923; Principi, 1924).

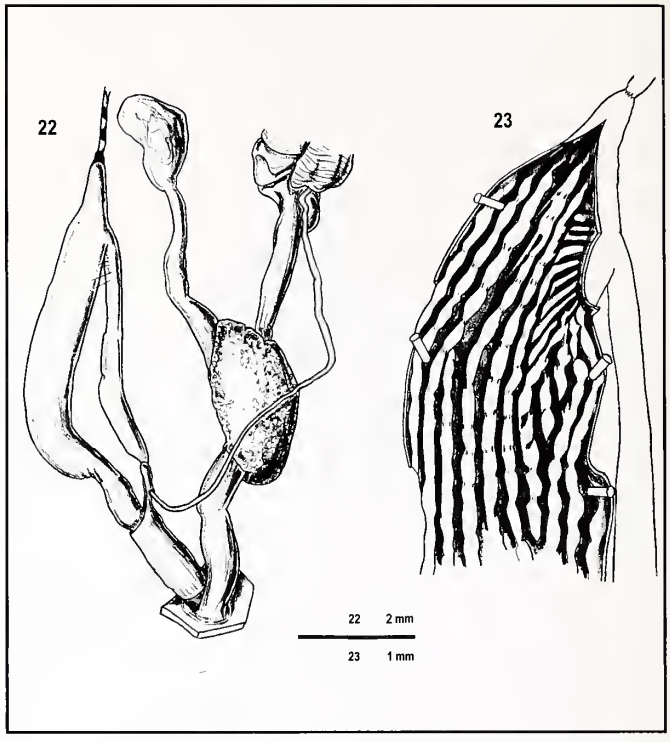
The two species described by Giusti (1969) were named after Paolo Tongiorgi and Lothar Forcart respectively. Paolo Tongiorgi is professor of Ethology at the University of Modena (Italy). His main topics of research are orientation and migration in coastal arthropods, chemioreception in *Anguilla anguilla*, behaviour of *Marmota marmota*, taxonomy of Aracnida and Gastrotricha. Lothar Forcart (1902-1990) from Basel (Switzerland) was a leading malacologist who published important contributions on the systematics of Palaearctic gastropods (Verdcourt, 1991; Wüthrich *et al.*, 1993).

NOMENCLATURE

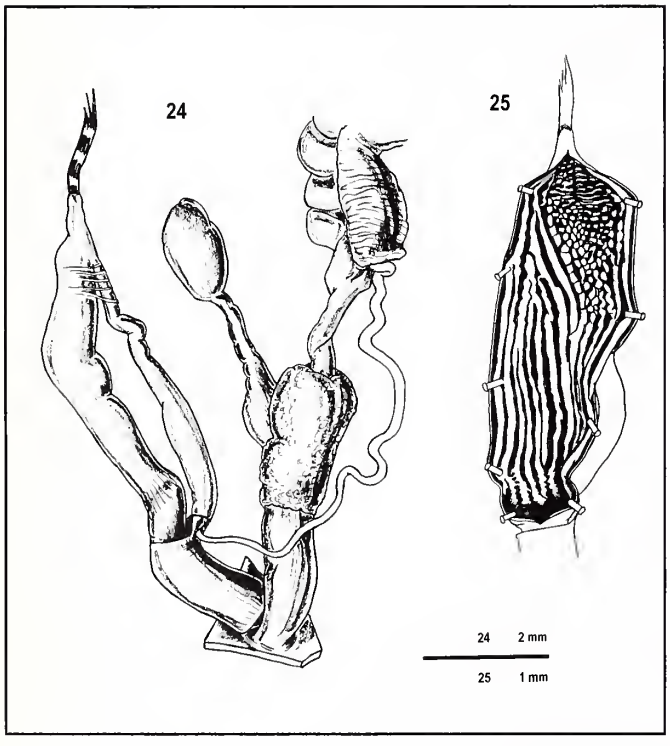
Many other nominal taxa have been introduced for Tuscan *Oxychilus*, but only one is older than *O. meridionalis*, and described on specimens collected within the area of distribution of this



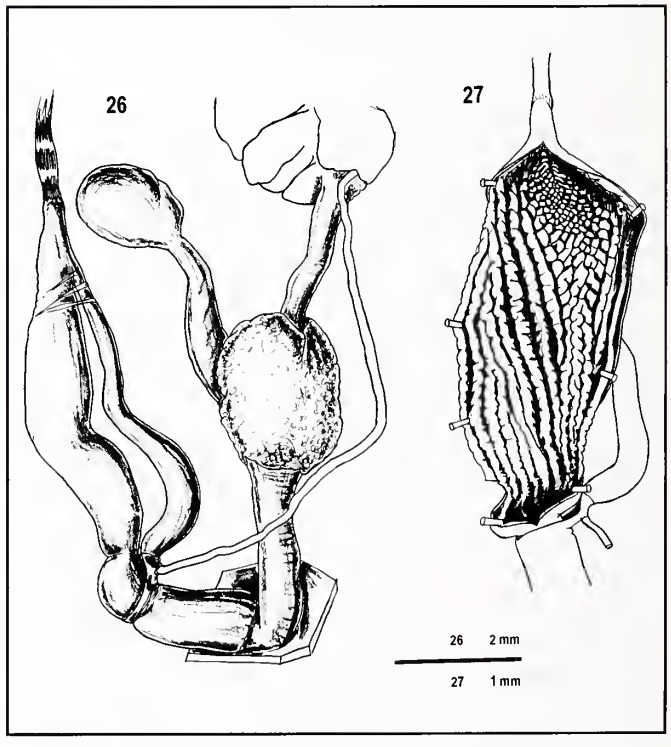
Figs. 20-21. Distal genitalia (Fig. 20) and internal ornamentation of flagellum and proximal penis (Fig. 21) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Tenuta di San Rossore, Gombo (Pisa, PI), 32TPP0341, F. Giusti & G. Manganelli leg. 22.12.82.



Figs. 22-23. Distal genitalia (Fig. 22) and internal ornamentation of flagellum and proximal penis (Fig. 23) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Alpi Apuane, Monte Forato, q. 450 m (Stazzema, LU), 32TPP07, F. Giusti leg. 16.6.70.



Figs. 24-25. Distal genitalia (Fig. 24) and internal ornamentation of flagellum and proximal penis (Fig. 25) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Capanno (Castelnuovo Berardenga, SI), 32TPP9308, G. Manganelli leg. 25.4.83.



Figs. 26-27. Distal genitalia (Fig. 26) and internal ornamentation of flagellum and proximal penis (Fig. 27) in a specimen of *Oxychilus meridionalis* (Paulucci, 1881) from Torrente Arbia, Taverne d'Arbia (Siena, SI), 32TPN9496, G. Manganelli leg. 30.1.82.

Locality	E	F	P	DPD	PS	FO	DBC	DV
Torrente Arbia, Taverne d'Arbia, G. Manganelli leg. 30.1.82	7.1	1.5	9.0	1.2	2.1	2.9	2.8	3.6
	7.5	1.8	10.1	1.3	2.7	2.2	3.3	3.6
	6.2	1.4	9.0	1.1	2.2	1.6	3.2	2.8
Tenuta di San Rossore, Gombo, F. Giusti & G. Manganelli leg. 22.12.82	5.8	1.4	7.5	0.9	1.2	1.9	3.3	3.4
	4.9	1.0	6.1	0.8	1.9	2.2	3.6	3.3
	5.0	1.5	7.2	0.9	1.9	1.6	3.2	2.2
	4.1	1.1	7.1	0.7	1.9	1.2	2.5	2.1
	4.7	1.2	6.9	0.9	2.1	1.9	2.8	3.1
Alpi Apuane, Levigliani (Stazzema, LU), F. Giusti & G. Manganelli, leg. 28.6.83	7.7	1.7	11.6	1.1	2.9	3.1	4.4	4.0
Alpi Apuane, Monte Forato, q. 700 m, F. Giusti leg. 16.6.70	5.1	1.5	8.9	0.8	2.0	3.3	4.1	4.0
	4.2	1.3	8.0	0.6	2.8	2.4	2.7	2.9
	5.2	1.6	7.6	0.7	1.6	2.6	3.2	2.8
Grotta delle Fate di Cima la Sugheretta, G. Comotti & A. Baldan leg. 11.7.85	4.0	1.4	5.7	0.7	1.4	1.9	1.9	2.2
	4.0	1.2	4.9	0.6	0.8	2.5	2.6	1.2
	4.5	1.1	6.1	0.7	1.3	2.3	2.9	2.4
Bagni di Lucca, B. Sabelli leg. 4.2.76.	3.7	2.3	4.1	0.7	1.9	1.4	2.9	2.1
	5.0	2.1	6.7	1.1	2.9	2.7	5.2	2.2
	4.4	1.5	5.3	0.7	2.1	2.4	2.6	2.9
Fabbriche di Bagni di Lucca, along Borro Legara,	5.3	2.7	7.2	0.7	1.1	1.8	4.4	1.1
S. Cianfanelli & G. Manganelli leg. 31.10.98.	5.6	2.7	7.6	0.7	1.6	1.9	6.2	1.9
Montauto, G. Manganelli leg. 28.12.83	6.1	1.7	8.3	1.1	2.5	1.4	3.9	2.7
Poggio del Comune, G. Manganelli leg. 7.10.82	5.7	1.4	8.2	0.9	2.4	1.3	2.5	3.4
	6.2	1.2	8.1	0.9	2.3	1.7	3.5	2.9
Capanno G. Manganelli leg. 25.4.83	6.7	1.5	8.9	1.1	2.4	2.4	2.8	2.6
	7.4	1.7	8.9	1.1	1.2	2.5	2.2	3.4
Torrente Arbia, Balze di Caspreno, G. Manganelli leg. 8.4.82	7.7	1.9	8.9	1.3	2.2	2.1	2.3	3.3

Table 2. – Dimensions (in mm) of parts of the distal genitalia in specimens of *Oxychilus meridionalis* (Paulucci, 1881). For details of localities, see Material examined. E epiphallus, F flagellum, P penis, DPD distal penis diameter, FO free oviduct, DBC, duct of bursa copulatrix, PS penial sheath, DV distal vagina. For identification of the parts measured, see anatomical description.

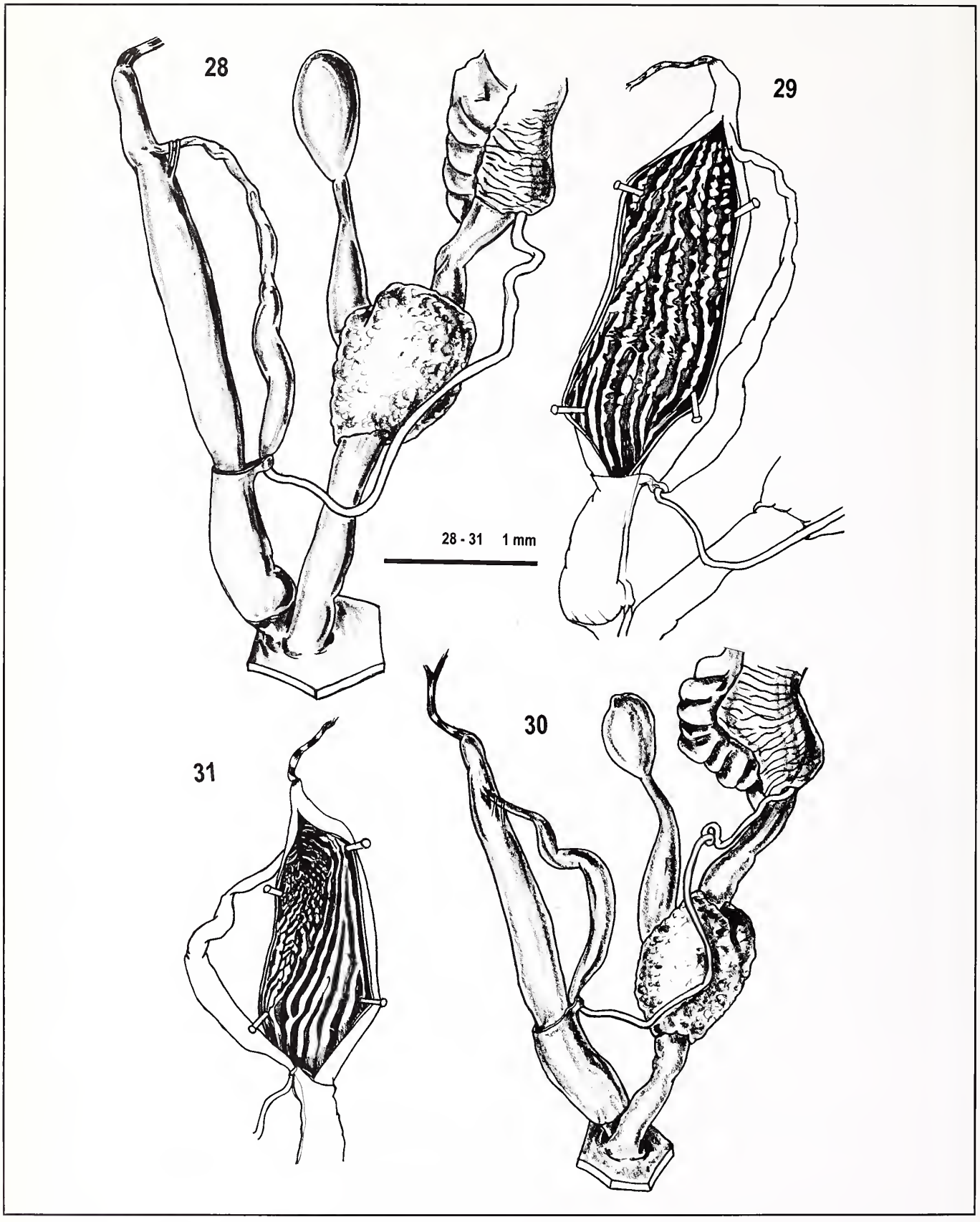
Locality	Number of mid penis pleats	Number of specimens examined
Pozzo della Casamatta di Monte Branzi 519 Li/Sp, L Briganti & S Zoia leg. 5.11.79	5-9	1
Grotta dei Fiorentini, A. Sassi leg. 16.9.66	5-7 to 7-8	2
Torrente Arbia, Taverne d'Arbia, G. Manganelli leg. 30.1.82	12 to 14	1
Tenuta di San Rossore, Gombo, F. Giusti & G. Manganelli leg. 22.12.82	5-6 to 6-9	3
Alpi Apuane, Levigliani, F. Giusti & G. Manganelli, leg. 28.6.83	9-10	1
Alpi Apuane, Monte Forato, q. 450 m, F. Giusti leg. 16.6.70	8-9	1
Alpi Apuane, Monte Forato, q. 700 m, F. Giusti leg. 16.6.70	8	1
Buca dei Ladri 262 T/PI, P. Tongiorgi & M. Riccucci leg. 15.7.67, M. Riccucci leg. 30.11.69.	7-8 to 9	2
Grotta delle Fate di Cima la Sugheretta, G. Comotti & A. Baldan leg. 11.7.85	7-9 to 7-12	2
Bagni di Lucca, B. Sabelli leg. 12.4.73, B. Sabelli leg. 28.3.74, B. Sabelli leg. 4.2.76.	7-10 to 9-10	3
Fabbriche di Bagni di Lucca, along Borro Legara, S. Cianfanelli & G. Manganelli leg. 31.10.98.	8-10 to 8-12	2
Poggio del Comune, G. Manganelli leg. 7.10.82	11-13 to 13-15	2
Capanno G. Manganelli leg. 25.4.83	11-13	1
Passo La Calla F. Giusti leg. 22.6..	7-9 to 7-10	2

Table 3. Number of pleats in mid penis of specimens of *Oxychilus meridionalis* (Paulucci, 1881). As the pleats divide or fuse inside the mid portion of penis, the minimum and maximum number of pleats is given. For details of localities, see Material examined.

species: *Hyalina scotophila* De Stefani, 1879 (Type locality: "Siena, in profondo condotto sotterraneo"). This nominal taxon was based on three shells collected by S. Bonelli and first published by him (Bonelli, 1878, as *Hyalina aquitanica*). Type material of this species is kept in the Museo Zoologico dell'Accademia dei Fisiocritici in Siena. It consists of three not fully adult specimens of an unidentified *Oxychilus* species. Since we have only ever collected one species in Siena, namely *O. draparnaudi* (Bech, 1837), *H. scotophila* is probably a junior synonym of the latter.

TAXONOMY

Oxychilus meridionalis (Paulucci, 1881) is characterized by wide conchological and anatomical variability (Figs. 1-31; Tables 1-3). The shell diameter of sexually adult specimens



Figs. 28-31. Distal genitalia (Figs. 28, 30) and internal ornamentation of flagellum and proximal penis (Figs. 29, 31) in specimens of *Oxychilus meridionalis* (Paulucci, 1881) from Passo La Calla (Stia, AR), 32TQP2060, F. Giusti leg. 22.6.68.

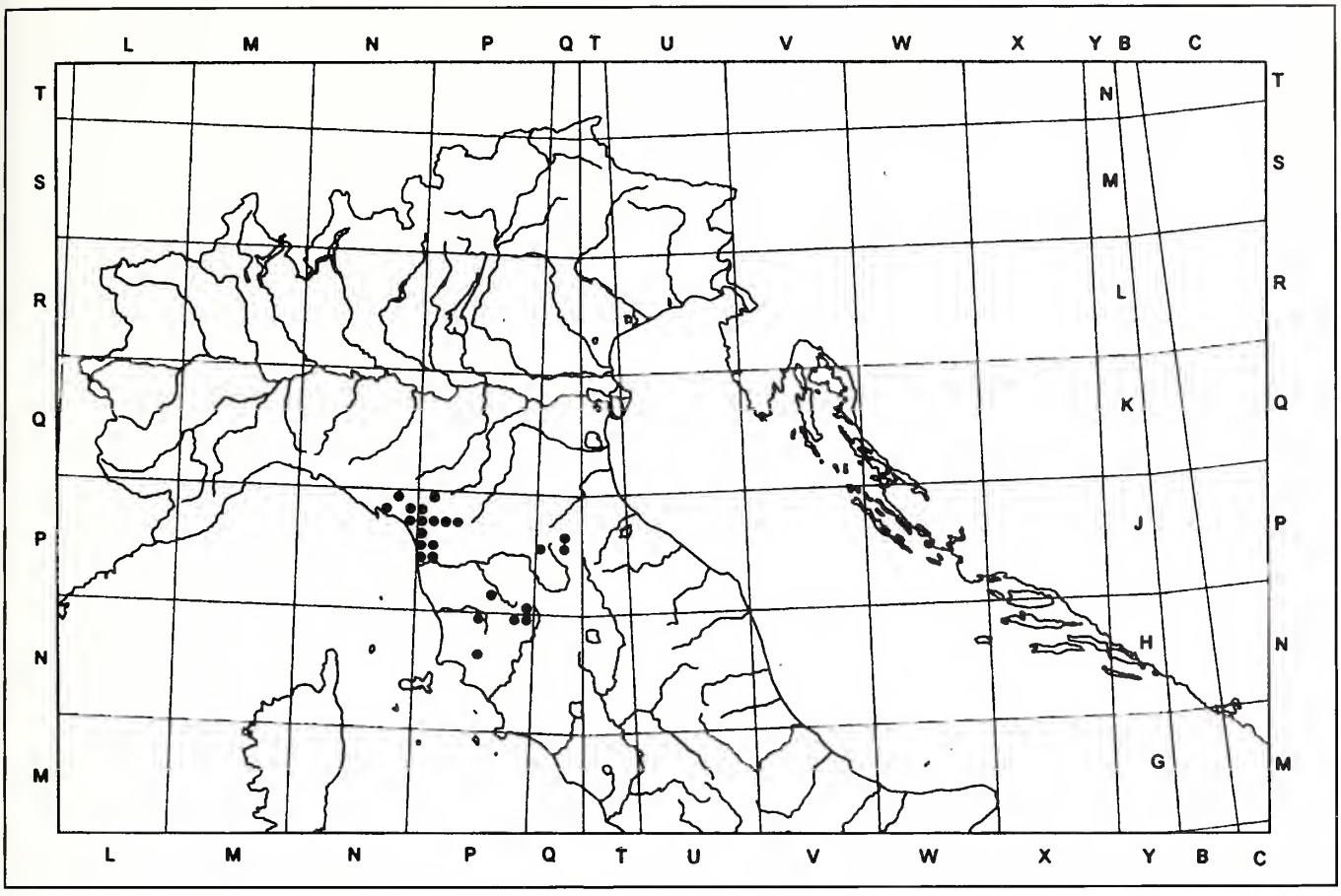


Fig. 32. The distribution of *Oxychilus meridionalis* (Paulucci, 1881) on UTM map of central-northern Italy.

varies from a minimum of 8.9 mm (Apuan Alps, Pania della Croce) to a maximum of 16.6 mm (Apuan Alps, Levigliani and Monte Forato). Size variation is also wide within populations (10.8 to 14.3 at Gombo, n: 10; 10.6 to 14.1 at Capanno, n: 10; 11.9 to 14.1 at Poggio del Comune, n: 7) (Table 1). Shell shape is discoidal, usually tectiform, but sometimes depressed; the aperture is oval and oblique, and sometimes displaced downwards to different degrees. The internal sculpture of flagellum and penis also varies widely (especially around the epiphallus opening where the usual system of radial pleats is fragmented to a variable extent into many papillae of different size) and in the number of longitudinal pleats at mid penis (which ranges from 5-7 to 12-15). Although this variability is remarkable, it is no help for establishing divisions in the populations examined, because it is impossible to pinpoint a consistent and decisive pattern distinguishing more specific or subspecific entities.

The distinction of *O. meridionalis* from the other sympatric *Oxychilus* species is easy in the case of *O.* (s.str.) *clarus* (Held, 1838), O. *(Mediterranea) hydatinus* (Rossmässler, 1838) and *O.* (s.str.) *uziellii* (Issel, 1872), but difficult in the case of *O.* (s.str.) *draparnaudi* (Beck, 1837), the most widespread *Oxychilus* species in inland Tuscany.

The medium-sized, yellowish shell immediately distinguishes *O. meridionalis* from *O. clarus* and O. *hydatinus* (the latter two are very small to small in size and with a whitish shell; KERNEY *et al.*, 1983: Pl. 10). The shell, round below, with the last whorl dilated near aperture, sometimes slightly angled at periphery, the sutures shallow, the umbilicus slightly narrow, and the aperture oval and oblique enable most of the specimens of *O. meridionalis* to be distinguished from *O. uziellii* (shell rather flat below, with last whorl only slightly dilated, usually slightly angled at base; sutures deep; umbilicus wide, funnel-shaped, aperture subtriangular to oval, oblique, often displaced downwards; MANGANELLI & GIUSTI, 1985: Figs. 3 A-B, D-F, 4 A-D; 1993: Fig. 7; 2000: Figs. 1-5). However, smaller specimens of *O. meridionalis* with the aperture more or less displaced downwards (Fig. 8) are very reminiscent of *O. uziellii* and the conchological distinction between the two species can easily escape the untrained eye. Dubious cases of this kind can be settled by anatomical study (*O. uziellii* has a penial flagellum peculiarly developed and proximal penis very reduced; internal ornamentation of flagellum and proximal penis consists of a system of transverse pleats converging towards a longitudinal double

Species	Size range	Geographical distribution	Main references
O. alliarius (Miller, 1822)	5.5 – 7.0 mm (KERNEY *et al.*, 1983)	Western Palaearctic	TAYLOR (1907), WÜTRICH (1963), RIEDEL (1957, 1980), GITTENBERGER *et al.* (1984), CASTILLEJO (1985)
? *O. anjana* Altonaga, 1986	7.3 – 10.1 mm (ALTONAGA, 1986)	Northern Spain	ALTONAGA (1986, 1989)
O. basajana Altonaga, 1990	10,1 – 13.0 mm (ALTONAGA, 1990)	Northern Spain	ALTONAGA (1990)
O. caspius (Boettger, 1880)	7.0 – 9.0 mm (RIEDEL, 1996)	Northern Iran	RIEDEL (1959, 1966, 1980, 1981)
O. clarus (Held, 1838)	4.0 – 4.2 mm (KERNEY *et al.*, 1983)	Western Europe	FORCART (1957), RIEDEL (1980), GIUSTI *et al.* (1985), MANGANELLI & GIUSTI (1993)
O. concinnus (Westerlund, 1896)	not more than 8.0 mm (RIEDEL, 1966)	Northwestern Iran	RIEDEL (1966, 1980, 1981)
O. courquini (Bourguignat, 1870)	5.0 – 5.6 mm (RIEDEL, 1972)	Northwestern Spain (Catalonia)	RIEDEL (1972, 1980)
O. decipiens (Boettger, 1886)	6.5 – 10.5 mm (RIEDEL, 1966)	Northeastern Turkey and Caucasus	RIEDEL (1966, 1980)
O. emmae (Akramowski, 1955	non more than 5.8 mm (RIEDEL, 1966)	Lesser Caucaus	RIEDEL (1966, 1980, 1995)
? *O. gardinii* Manganelli, Bodon & Giusti, 1991	13.0 – 16.5 mm (MANGANELLI *et al.*, 1991)	Northern Italy (Liguria)	MANGANELLI *et al.* (1991)
O. helveticus (Blum, 1881)	8.0 – 10.0 mm (KERNEY *et al.*, 1983)	Western Europe	RIEDEL (1957, 1964a, 1970, 1980), WÜTRICH (1963), ALTONAGA (1991)
O. juvenostriatus Riedel, 1964b	5.5 – 7.8 mm (RIEDEL, 1964b)	Azores (Faial I.)	RIEDEL (1964b, 1980)
O. lentiformis (Kobelt, 1882)	up to 13.0 mm (RIEDEL, 1969)	Baleares (Mallorca and Menorca)	RIEDEL (1969, 1980)
O. lineolatus Frias Martins & Ripken, 1991	7.5 – 10.6 mm (FRIAS MARTINS & RIPKEN, 1991)	Azores (Santa Maria I.)	FRIAS MARTINS & RIPKEN (1991)
O. mercadali Gasull, 1969	7.0 – 10.5 mm (RIEDEL, 1972)	Western Spain (Valencia)	RIEDEL (1972, 1980)
O. miguelinus Pfeiffer, 1856	up to 15.0 mm (RIEDEL, 1964b)	Azores	RIEDEL (1964b, 1980)
O. ornatus Riedel, 1964	4.7 – 5.6 mm (RIEDEL, 1964b)	Azores (I. Faial)	RIEDEL (1964b, 1980)
? *O. patulaeformis* (Boettger, 1889)	7.0 mm (RIEDEL, 1966)	Northwestern Iran	RIEDEL (1980, 1998)
O. paulucciae (De Stefani, 1883)	17.9 – 18.7 mm (FORCART, 1967, as *O. lanzai*)	Central Italy (Tuscany)	FORCART (1967), RIEDEL (1980), MANGANELLI *et al.* (1995)
O. perspectivus (Kobelt, 1881)	6.0 – 8.5 mm (GIUSTI, 1973)	Southern Italy	GIUSTI (1973), RIEDEL (1980)
O. pityusanus Riedel, 1969	up to 9.3 mm (RIEDEL, 1969)	Baleares (Pityuses Is.)	RIEDEL (1969, 1980)
O. rateranus (Servain, 1880)	10.0 – 13.0 mm (RIEDEL, 1972)	Southern Spain	RIEDEL (1972, 1980)
O. scoliura Frias Martins, 1989	13.7 mm (FRIAS MARTINS, 1989)	Azores	FRIAS MARTINS (1989)
O. subeffusus (Boettger, 1879)	up to 4.7 (RIEDEL, 1966)	Northeastern Turkey and northern Iran	RIEDEL (1966, 1980), AKRAMOWSKI (1976)
O. tomlini (Smith, 1905)	up to 16 mm (RIEDEL, 1966)	Southern Greece	RIEDEL (1980, 1990)
O. translucidus (Mortillet, 1854)	7.0 – 7.5 mm (RIEDEL, 1966, as *O. komarowi*)	? Northern Iran. Introduced in western Caucasus, Turkey, Bulgaria and Poland	RIEDEL (1966, 1980, 1989)
O. tropidophorus (Mabille, 1869)	19.0 – 20.0 mm (GERMAIN, 1930)	Corsica	GERMAIN (1930)
? *O. uziellii* (Issel, 1872)	9.8 – 12.5 mm (GIUSTI & MANGANELLI, 2000)	Central Italy (Tuscany and Emilia)	MANGANELLI & GIUSTI (1985, 1993, 2000)

Table 4. Species assigned to *Oxychilus (Ortizius)* by Riedel (1980, 1998) (a question mark indicates tentative assignment).

cordon, opposite the opening of the epiphallus into the penis; MANGANELLI & GIUSTI, 1985: Figs. 1 A-D, 2 A-C; 1993: Figs. 4-5; 2000: Figs. 6-10). DE STEFANI's reports (1875, 1879, 1883-88) of *O. uziellii* from the Apuan Alps and Garfagnana were probably based on specimens of *O. meridionalis* with similar features.

No qualitative or quantitative shell character distinguishes *O. meridionalis* from *O. draparnaudi*. The garlic-like smell is the only external feature which may give some indication. Although this smell aids identification of *O. meridionalis*, its absence does not prove that the specimen belongs to *O. draparnaudi*, because it is an inconstant feature. Consequently, only anato-

mical study enables certain discrimination of the two species (in *O. draparnaudi* the proximal penis is separated from the distal portion by an abrupt constriction, a very slender twisted "bottle-neck" concealed by a thin translucent sheath, and its internal surface is covered with rows of papillae which stop before the "bottle-neck"; GIUSTI & MANGANELLI, 1997: Figs. 15-30, MANGANELLI & GIUSTI, 1998: Figs. 19-22).

O. meridionalis belongs to *Oxychilus* (s.str.) sensu GIUSTI & MANGANELLI (1999). In fact it shares the following characters with the *Oxychilus* (s.str.) species: penis with flagellum; penial retractor inserted at apex of flagellum; internal ornamentation of penis consisting of pleats and rows of papillae; epiphallus long, usually more than proximal penis; internal wall of the epiphallus with slender longitudinal pleats; mucous gland mainly vaginal; long mesocone of central tooth. Among the *Oxychilus* (s.str.), it shares a sac-like penis, without the evident mid-penial constriction and sheath with *O. cellarius* (Müller, 1774) and *O. pilula* (Paulucci, 1886) and the pleats inside the proximal penis with the species assigned to *Ortizius* Forcart, 1957 (type species: *Hyalina (Polita) helvetica* Blum, 1881). It is distinguished from *O. cellarius* and *O. pilula* by virtue of the internal ornamentation of penis (in the proximal penis of *O. cellarius*, there is a variable number (6-8) of rows of very few, large papillae; in the proximal penis of *O. pilula* there are 8-10 rows of numerous, polygonal or pyramidal papillae). *O. meridionalis* is also distinguished from *O. pilula* in shell shape (the shell of *O. pilula* is *Retinella*-like) (for *O. cellarius*, see GIUSTI & MANGANELLI, 1997: Figs. 3-14; for *O. pilula*, see MANGANELLI *et al.*, 1999: Figs. 19-21).

The distinction of *O. meridionalis* from many "*Ortizius*" species is more problematical, due to the fact that this alleged subgenus is a large assemblage of species (Table 4), many of which are relatively unknown. Among the 28 species assigned to this subgenus by RIEDEL (1980, 1998), *O. patulaeformis* (Boettger, 1889) is anatomically unknown and *O. subeffusus* (Boettger, 1879) is possibly related to another subgenus, i.e. *Mediterranea* Clessin, 1880 (type species: *Helix hydatina* Rossässler, 1838) (see GIUSTI & MANGANELLI, 1999). All remaining species are known anatomically, but the internal structure of the penial complex (flagellum, proximal and distal penis) is only known in sufficient detail in six of them (*O. anjana* Altonaga, 1986, *O. basajana* Altonaga, 1990, *O. clarus* (Held, 1838), *O. gardinii* Manganelli, Bodon & Giusti, 1991, *O. lineolatus* Frias Martins & Ripken, 1991, and *O. uziellii*), The internal structure of the penis is known in three other species (*O. miguelinus* Pfeiffer, 1856, *O. perspectivus* Kobelt, 1881 and *O. translucidus* (Mortillet, 1854)), but the details of the ornamentation around the epiphallus opening are missing or unclear. The internal anatomy of the other species is relatively or completely unknown.

O. meridionalis is easily distinguished from many species by its larger size. Species smaller in size include some well known ones, such as the western European *O. clarus*, the European *O. alliarius* (Miller, 1822), the southern Italian *O. perspectivus* (Kobelt, 1881), and others, which are less known such as the Azorean *O. ornatus* Riedel, 1964, and *O. juvenostriatus* Riedel, 1964), the western Spanish *O. courquini* (Bourguignat, 1870), the northern Iranian *O. translucidus* (Mortillet, 1854), the Caucasian *O. emmae* (Akramowski, 1955), and the northern Iranian *O. patulaeformis* (Boettger, 1889) and *O. concinnus* (Westerlund, 1896) (Table 4). Moreover the yellowish, brownish or greenish shell distinguishes *O. meridionalis* from *O. clarus* and *O. perspectivus*, both of which have a whitish shell.

Many other species have specimens of a size which falls in the range of *O. meridionalis*, in increasing order of size: *O. caspius* (Boettger, 1880), *O. pityusanus* Riedel, 1969, *O. helveticus* (Blum, 1881), *O. anjana*, *O. decipiens* (Boettger, 1886), *O. mercadali* Gasull, 1969, *O. lineolatus*, Frias Martins & Ripken, 1991, *O. uziellii*, *O. rateranus* (Servain, 1880), *O. basajana*, *O. lentiformis* (Kobelt, 1882), *O. scoliura* Frias Martins, 1989, *O. miguelinus* Pfeiffer, 1856, *O. tomlini* (Smith, 1905), *O. gardinii* Manganelli, Bodon & Giusti, 1991. Two other species are slightly larger: *O. paulucciae* (De Stefani, 1883) and *O. tropidophorus* (Mabille, 1869) (Table 4).

The shell and anatomical characters distinguish *O. meridionalis* readily from the sympatric *O. uziellii* (see above) which is quasi-endemic to Tuscany and the anatomical characters distinguish it from the peculiar northern Spanish *O. anjana* and *O. basajana*, the Ligurian *O. gardinii* and the Azorean *O. lineolatus* (very short, inflated penial complex in *O. anjana*; internal surface of penis with many (30-35) small longitudinal pleats in *O. basajana*; very slender proximal penis in *O. gardinii*; very short penial complex in *O. lineolatus*; for *O. anjana*, see ALTONAGA, 1986: Figs. 1-19; or *O. basajauna*, ALTONAGA, 1991: Figs. 2-4; for *O. gardinii*, see MANGANELLI *et al.*, 1991: Figs. 7-20; for *O. lineolatus*, see FRIAS MARTINS & RIPKEN, 1991: Fig. 5).

The usually larger discoidal, tectiform or flattened shell with a wider umbilicus and the absence of a black edge to the mantle distinguish it from the western European *O. helveticus* (Blum, 1881), the size (SD: 8.0 – 10.0 mm; KERNEY *et al.*, 1983) of which overlaps with that of the smaller specimens of *O. meridionalis* (slightly globose shell with a narrower umbilicus and black edge to the mantle in *O. helveticus*; KERNEY *et al*, 1983: Pl. 10).

O. meridionalis is difficult to differentiate from the other species on the basis of the available knowledge. Some range in size from the smallest *O. meridionalis* to slightly larger. This group includes four species, all with restricted distribution: the northern Iranian *O. caspius* (Boettger, 1880), the Balearian *O. pityusianus* Riedel, 1969, the Anatolian and Caucasian *O. decipiens* (Boettger, 1886), the western Spanish *O. mercadali* Gasull, 1969. Others fall in the size range of *O. meridionalis*: the Balearean *O. lentiformis* (Kobelt, 1882), the Azorean *O. scoliura* Frias Martins, 1989 and *O. miguelinus* (Pfeiffer, 1856) and the Greek *O. tomlini* (Smith, 1905). Some of these species seem to have a longer flagellum (*O. tomlini*) and others a constriction between the proximal and distal penis (*O. decipiens* and *O. scoliura*) (for *O. decipiens*, see RIEDEL, 1966: Fig. 66; for *O. scoliura*, see FRIAS MARTINS, 1989: Figs. 17A-17B; for *O. tomlini*, see RIEDEL, 1990: Fig. 25).

Finally, two other species are larger in size than *O. meridionalis*: the Tuscan *O. lanzai* Forcart, 1967 (= *O. paulucciae* De Stefani, 1883, sensu RIEDEL, 1980), and the Corsican *O. tropidophorus*

(Mabille, 1869), both of which are in need of revision.

When FORCART (1967, 1968) began the revision of the Tuscan *Oxychilus*, he based his work on cave specimens sent to him for determination, mainly by Prof. B. Lanza of the Museo di Zoologia dell'Università di Firenze. Unfortunately he did not have topotypical specimens of the classic Tuscan taxa at his disposal and therefore based his analysis on the study of specimens with shells similar to that of the types. He studied only very few specimens anatomically and was thus unable to realize the wide conchological and anatomical variability of these entities. He therefore regarded *O. meridionalis* and *O. isselianus* as two distinct species belonging to *Oxychilus* (s.str.), based on specimens of *O. draparnaudi*, and assigned the *Ortizius*-like *Oxychilus* to different species: the small-sized, *uziellii*-like forms to "*O. obscuratus*" (Villa & Villa, 1841), and the large forms to "*O. porroi*" (Paulucci, 1882). "*O. obscuratus*" is a nominal taxon, related to a species from Corsica, in need of revision; "*O. porroi*", described from Genoa, is a junior synonym of *O. draparnaudi* (MANGANELLI *et al.*, 1995). The two species described by GIUSTI (1969a), *O. tongiorgii* and *O. forcartianus*, are also based on specimens belonging to this species (Figs. 16-19).

HABITAT

Oxychilus meridionalis is moderately calciophile and lives in litter, under stones or decaying wood, mainly in woods of deciduous mesophilous broadleafs, from sea level to 1500 m of altitude.

GEOGRAPHICAL DISTRIBUTION

Species with reduced distribution, limited to Tuscany and eastern Liguria (the Lerici area; MANGANELLI *et al.*, 1995). In Tuscany it seems to be present in three main areas: roughly the Apuan Alps and Monte Pisano in the northwest, the Colline Metallifere, Montagnola Senese and southern Chianti in the south, and the Tuscan Apennine ridge in the northeast.

STATUS AND CONSERVATION

Not globally threatened. *Oxychilus meridionalis* has a limited distribution, but it does not seem to be under any particular threat at present.

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Marine malacological records (Gastropoda: Prosobranchia, Heterobranchia, Opisthobranchia and Pulmonata) from Torres de Alcalá, Mediterranean Morocco, with the description of a new philinid species

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KEY WORDS: Cala Iris, faunistics, Gastropoda, marine, Mediterranean Sea, Morocco, *Philine iris* n. sp., records, Recent.

ABSTRACT The present paper records some noteworthy gastropod species at Cala Iris, a cove on the coast of Torres de Alcalá (= Torres el Kal'a, 35°10' N, 04°19' W), Mediterranean Morocco. These species belong to the families Diastomatidae Cossmann, 1893, Rissoidae J.E. Gray, 1847, Eulimidae H. Adams & A. Adams, 1853, Buccinidae Rafinesque, 1815, Marginellidae Fleming, 1828, Hyalogyrinidae Warén & Bouchet, 1993, Philinidae J.E. Gray, 1850, and Ellobiidae A. Adams, 1855. The records are commented in brief notes. Some notes contain also remarks on the nomenclature and/or systematics of the species. *Philine iris* n. sp. is here described on the basis of empty shells, and is compared with the most similar Atlantic-Mediterranean species. The present paper includes also the first Mediterranean record of the Eastern Atlantic *Philine condensa* van der Linden, 1995, and the first Eastern Mediterranean record of *Philine intricata* Monterosato, 1884.

RIASSUNTO Sono segnalate alcune specie di gasteropodi (Prosobranchia, Heterobranchia ed Opisthobranchia) di particolare interesse dal fondale infralitorale di Cala Iris, una baia nei pressi di Torres de Alcalá (= Torres el Kal'a, 35°10' lat. nord, 04°19' long. ovest), sulla costa mediterranea del Marocco, a 130 km ca. da Ceuta. Da questa località è qui descritta *Philine iris* n. sp., sulla base della sola morfologia conchiliare. La nuova specie presenta una conchiglia simile a *Philine punctata* (J. Adams, 1800), la cui scultura spirale, però, è composta di file di fossette non collegate tra loro, mentre su *P. iris* le fossette sono collegate a formare strie catenoidi. La protoconca di *P. iris* è meno larga, con nucleo meno prominente, e scolpita in modo più grossolano da granuli di forma irregolare, disposti disordinatamente. *Philine catena* (Montagu, 1803) è anch'essa prossima per dimensioni, forma generale e scultura. *P. iris* ha, tuttavia, profilo più arrotondato, sia frontalmente, che lateralmente, è meno ristretta verso la sommità, ha labbro interno più flessuoso e strie spirali più delicate, che iniziano come strie ondulate semplici per assumere con maggiore gradualità il caratteristico aspetto catenoide. La protoconca di *P. iris* è di maggiori dimensioni, ma scolpita in modo analogo. Questa specie è probabilmente la «*Philine* sp.» recentemente segnalata da Moreno & Templado (1998) per la Spagna meridionale e Ceuta e la *Philine* raffigurata vivente da Mifsud (1996) come «*Philine quadrata* (S.V. Wood, 1839)». *Alvania sculptilis* (Monterosato, 1877) è specie comune a Torres de Alcalá, simile a – o, forse, solo una forma di - *Alvania scabra* (Philippi, 1844), che sembra rimpiazzare nell'estremo Mediterraneo occidentale, distinta per la variabile consistenza della scultura assiale, in molti casi pressoché evanescente, i tre cordoni spirali decorrenti sul penultimo giro sopra l'apertura, in luogo dei quattro di *A. scabra*, e la protoconca più arrotondata e con nucleo meno prominente. Gli esemplari con scultura maggiormente marcata sembrerebbero corrispondere ad *Alvania oranica* (Pallary, 1900), la cui identità resta, in ogni caso, incerta. *Alvania sculptilis* è abbondante a Torres de Alcalá, dove vive su alghe brune. *Alvania tessellata* (Weinkauff, 1868, ex Schwartz MS.), piuttosto comune a Torres de Alcalá, non sembra effettivamente distinta da *Alvania spinosa* (Monterosato, 1890), per come quest'ultima è generalmente identificata in letteratura. Il solo presunto carattere distintivo, la seconda fila spirale di noduli, in posizione abapicale, è incostante: su molte conchiglie la seconda fila di noduli è appena accennata dimostrando così l'esistenza di forme intermedie. La simile *Alvania pagodula* (B.D.D., 1884) può mostrare, anch'essa, una forma con una sola fila di noduli e, peraltro, *Alcidia spinosa* Monterosato – descritta su materiale pleistocenico e recente della Sicilia e non dall'areale lusitanico - potrebbe ben corrispondere, di fatto, a quest'ultima forma. Altre specie qui segnalate sono *Cassiella abylensis* Gofas, 1987, *Cingula trifasciata* (J. Adams, 1800), *Setia aartseni* (Verduin, 1984), *Setia slikorum* (Verduin, 1984), *Vitreolina cionella* (Monterosato, 1878), *Chauvetia* cfr. *retifera* (Brugnone, 1880) [= «*Pleurotoma pellisphocae* Reeve, 1845» sensu auctores], *Granulina vanhareni* (van Aartsen, Menkhorst & Gittenberger, 1984), *Hyalogyra zibrowii* Warén in Warén, Carrozza & Rocchini, 1997, *Brachystomia improbabilis* (Oberling, 1970), n. comb. [= *Odostomia verduini* van Aartsen, 1987], *Philine intricata* Monterosato, 1884, di cui si raffigura anche una piastra gastrica, e *Pseudomelampus kochi* (Pallary, 1900). Quest'ultima non è la specie tipo di *Pseudomelampus* Pallary, 1900, contrariamente a quanto talora indicato in letteratura: la specie tipo di *Pseudomelampus* è *Melampus exiguus* Lowe, 1835, per designazione successiva di Monterosato (1906). Non è da escludere, tuttavia, che *M. exiguus*, descritta originariamente da Madeira, possa essere, effettivamente, un sinonimo seniore di *P. kochi*. Il nome *Chauvetia* cfr. *retifera* (Brugnone, 1880) è qui adottato per la specie comunemente denominata *Chauvetia pellisphocae*, giacché il material tipico (NHML) di *Pleurotoma pellisphocae* Reeve, 1845, corrisponde ad un turride delle Indie Occidentali. Brugnone (1880) ha basato *Lachesis retifera* su una singola conchiglia fossile da Caltanissetta (Sicilia), ma Monterosato (1884; 1889b) sembrerebbe aver impiegato questo nome per la specie qui segnalata. Non avendo potuto ancora rintracciare l'olotipo di *Lachesis retifera*, probabilmente perduto, o altro materiale identificato come tale da Brugnone, questo nome è impiegato con beneficio di inventario, essendo più antico di *Chauvetia elongata* F. Nordsieck & García-Talavera, 1979, un nome, quest'ultimo, comunque da verificare. Infine, sono qui presentate anche le prime segnalazioni di *Philine condensa* van der Linden, 1995, per il mar Mediterraneo e di *Philine intricata* Monterosato, 1884, per il bacino orientale del Mediterraneo.

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INTRODUCTION

The present work points out the occurrence of some noteworthy gastropod species in the sublittoral bottoms of Torres de Alcalá (= "Torres el Kal'a", 35°10' N, 04°19' W - Fig. 1). The site lies on the Mediterranean coast of Morocco, about 130 km East of Ceuta, fully inside the Western Mediterranean basin. Other records from the same locality have been already published in recent years (e.g. Pizzini & Villa, 1993; Nofroni & Tringali, 1995; Tringali, 1996; Dell'Angelo & Tringali, 2000).

The following notes contain remarks on the species, and are mainly based on malacological material kept in Roman private collection. A large part of the material was obtained from three large samples of marine bioclastic sediment collected in 1991 and 1993. Other specimens were living on brown algae collec-

ted in 1991. All the samples were collected in the waters of Cala Iris, a cove on Torres de Alcalá's coast, with a small isle in the middle. Here are the samples listed in detail, following the chronological order of collecting:

Sample A: mixed medium-fine grained sediment, rocky bottom, 2-4 m (RV legit, May 7th, 1991);
Sample B: mostly fine sediment, from both rocky and sandy-muddy bottoms, 10 m (RV legit, May 7th, 1991);
Sample C: living molluscs found on brown algae, 1-4 m (RV & SF legerunt, May 10th, 1991);
Sample D: mostly fine sediment, West side of the Isle, collected from rocky to sandy-muddy bottom, 6-10 m (MO & RV legerunt, June 18th, 1993).

I was unable to examine all the malacological material sorted from these samples, which is scattered in several Roman private collections and also elsewhere. Therefore some interesting species possibly escaped the present report, and quantitative data are simply indicative.

Several shells of an undescribed species of the genus *Philine* Ascanius, 1772, have been noticed within the sediment. The new species is below described as *Philine iris* n. sp.

The present paper contains also the first Mediterranean record of *Philine condensa* van der Linden, 1995, from Palermo (Sicily), based on a lot deposited in the Monterosato coll. (Museo Civico di Zoologia, Roma), and the first Eastern Mediterranean record of *Philine intricata* Monterosato, from Crete Is. and Astipálaia Is. (= Astypalea Is., Cyclades Islands, Aegean Sea).

Abbreviations and acronyms

AG: Angelina Gaglini (†), Rome, Italy.
coll./colls.: collection(s);
d.: diameter;
dpt.: depth (size);
frg./frgs.: shell fragment(s);
h.: height;
sh./shs.: specimen(s) collected without soft parts;
spm./spms.: specimen(s) collected with soft parts;
IN: Italo Nofroni, Rome, Italy;
LPT: Lionello Paolo Tringali, Rome, Italy;
MNHN: Museum National d'Historie Naturelle, Paris, France;
MO: Marco Oliverio, Dipartimento di Biologia Animale e dell'Uomo, "La Sapienza" Roma-I University, Rome, Italy;
MP: Mauro Pizzini, Rome, Italy;
MTRS: Monterosato coll., Museo Civico di Zoologia, Rome, Italy;
NHMB: Naturhistorisches Museum, Bern (or "Musée d'Histoire Naturelle, Berne"), Switzerland.
NHML: Natural History Museum, London, U.K.;
RA: Roberto Ardovini, Rome, Italy;
RR: Ruggero Ruggeri, Rome, Italy;
RV: Raimondo Villa, Anguillara Sabazia (Rome), Italy;
SF: Sergio Farinelli, Rome, Italy;
SMNH: Swedish Museum of Natural History ("Naturhistoriska Rijksmuset"), Stockholm, Sweden;
w.: width;
ZMB: (Laboratory of Malacology,) Zoological Museum, Bologna University ("Museo di Zoologia, Università di Bologna"), Bologna, Italy;
ZMR: (Township) Zoological Museum, Rome, ("Museo Civico di Zoologia, Roma"), Italy;
ZMUC: Zoological Museum, University of Copenhagen, Denmark.

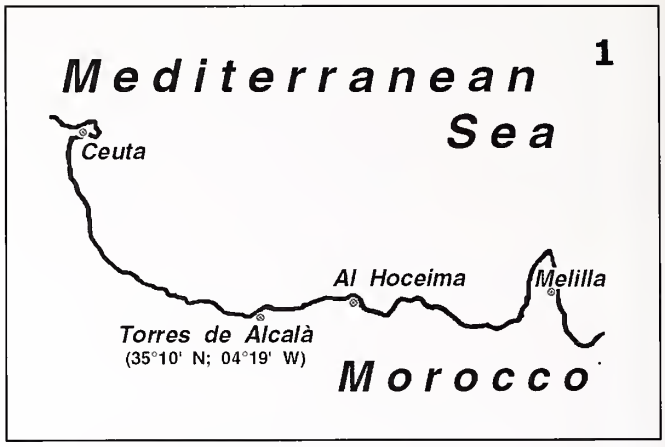


Fig. 1: Torres de Alcalá on the Northern coast of Morocco.

Classis GASTROPODA Couvier, 1797
Subclassis PROSOBRANCHIA, Milne-Edwards, 1848
Familia DIASTOMATIDAE Cossmann, 1893

Cassiella abylensis Gofas, 1987
(Figs. 3a-b)

Material examined
Samples A, B, and D, 6 shs. + several frgs. (LPT, MP, RA colls.).

Remarks - The species is known from the area around the Strait of Gibraltar, including both the African and European coasts (Gofas, 1987; van Aartsen et al., 1984: 75; 128, figs. 393, as «Gen. et sp. unknown»; Bellocq & Nofroni, 1989: 228; 232, fig. 5). It was also recorded from Fuengirola, Malaga (South Spain) (Bellocq & Nofroni, 1989: 228; 232, fig. 6; Giannuzzi-Savelli et al., 1997: 51, figs. 102-103). I examined few shells of this species from Cala Iris, all with weak spiral sculpture. The present record widens eastward the known range of *C. abylensis* along the coast of Morocco.

Familia RISSOIDAE J.E. Gray, 1847

Alvania sculptilis (Monterosato, 1877)
(Figs. 6a-c, 7, 8a-b)

Material examined

Alvania sculptilis – the type material of *Rissoa sculptilis*: 3 shs. (syntypes) from Algiers (Algeria), unrecorded depth, P. Joly legit (MTRS, box 22162); samples A, B, D, some hundreds of shs. and frgs. (IN, LPT, MP, RA, RR, RV, and SF colls.); sample C, 16 dry spms. (LPT, RV, SF colls.); Alboran Is. (South Spain), *Cystoseira* sediment 17 m, 7 shs. (LPT, & MO colls.); Punta Carnero, Algeçiras (South Spain), beached sediment, 15 shs. (IN, and LPT colls.); Northern beach of Getares, Algeçiras (South Spain), beached sediment, 24 shs. (IN, and RV colls.). *Alvania scabra* ss. – some hundreds of shs./spms. within lots from sediment or brown algae, various localities of the Central Mediterranean, in several colls.

Remarks - Originally described from Algeria (MONTEROSATO, 1877: 35; pl. III, figs. 6), *Alvania sculptilis* is closely similar to *Alvania scabra* ss. (Philippi, 1844) (Figs. 9a-b), perhaps being a Western Mediterranean cline of the latter. It may be distinguished by the absence of the fourth (abapical) spiral cord on the penultimate whorl above the aperture, the more variable axial sculpture, rather faint in some shell, and a more evenly rounded protoconch, with a less protruding nucleus. It shares the protoconch sculpture of *A. scabra*, with small granules arranged as irregular spiral rows. In *A. scabra* these rows of granules are somewhat closer each other, and less irregular, but this character seems variable. There are shells of *A. sculptilis* which bear weak or nearly faint axial ribs, setting off the spiral cords, having weak knobs, or nearly lacking them, especially on the body whorl, thus corresponding to the typical *A. sculptilis*. Other shells, however, display marked axial ribs, which make very prominent knobs by crossing the cords. The intermediates between the extreme sculpture patterns are frequent: therefore it is evident that there is a single variable species of the *A. scabra* group in Cala Iris' waters.

It is likely that the Algerian *Alvania oranica* (Pallary, 1900) is the same as the strongly sculptured form of this species (cf. GOFAS, 1990: 130, fig. 58). The original drawing of *A. oranica* shows four marked cords above the aperture (PALLARY, 1900: pl. VII, fig. 4), instead of the characteristic three cords of *A. sculptilis*. However, that drawing fails to show the actual shell morphology of *A. oranica*: Pallary himself drastically judged this drawing as «fort mauvaise», and considered that it does not allow to identify *A. oranica*, as he wrote on a brief note to Monterosato (Fig. 2), sent together with two syntypes of this species. So far, I have failed to find in the MTRS the syntypes of *A. oranica*, which were drawn from the ZMR for the Malacological Exhibition of Palazzo Braschi, Rome (1976). As other malacological material the syntypes never returned to their original place (on the negative effects of that Exhibition on the MTRS see OLIVERIO & TRINGALI, 2001). In fact, the identity of *A. oranica* is still unclear.

Also the shell figured by VAN AARTSEN et al. (1984: 112-113, figs. 102) as «*Alvania scabra*», from the Bay of Algeçiras, seems to belong to *A. sculptilis*. The original description and drawing (PHILIPPI, 1844: 126-127; pl. XXIII, fig. 8) of *Rissoa scabra* are based on (lost) Western Sicilian type material. They show that the shell bears four evident cords above the aperture, with sharply protruding knobs. This form is common along both the Sicilian and Italian coasts, usually identified as *A. scabra* (e.g. BOGI et al., 1983: 7, fig. 11; GIANNUZZI-SAVELLI et al., 1997: 109, figs. 448-449). Possibly *A. scabra* ss. could be restricted to this Central Mediterranean form, if it is proved that intermediates with *A. sculptilis* do lack.

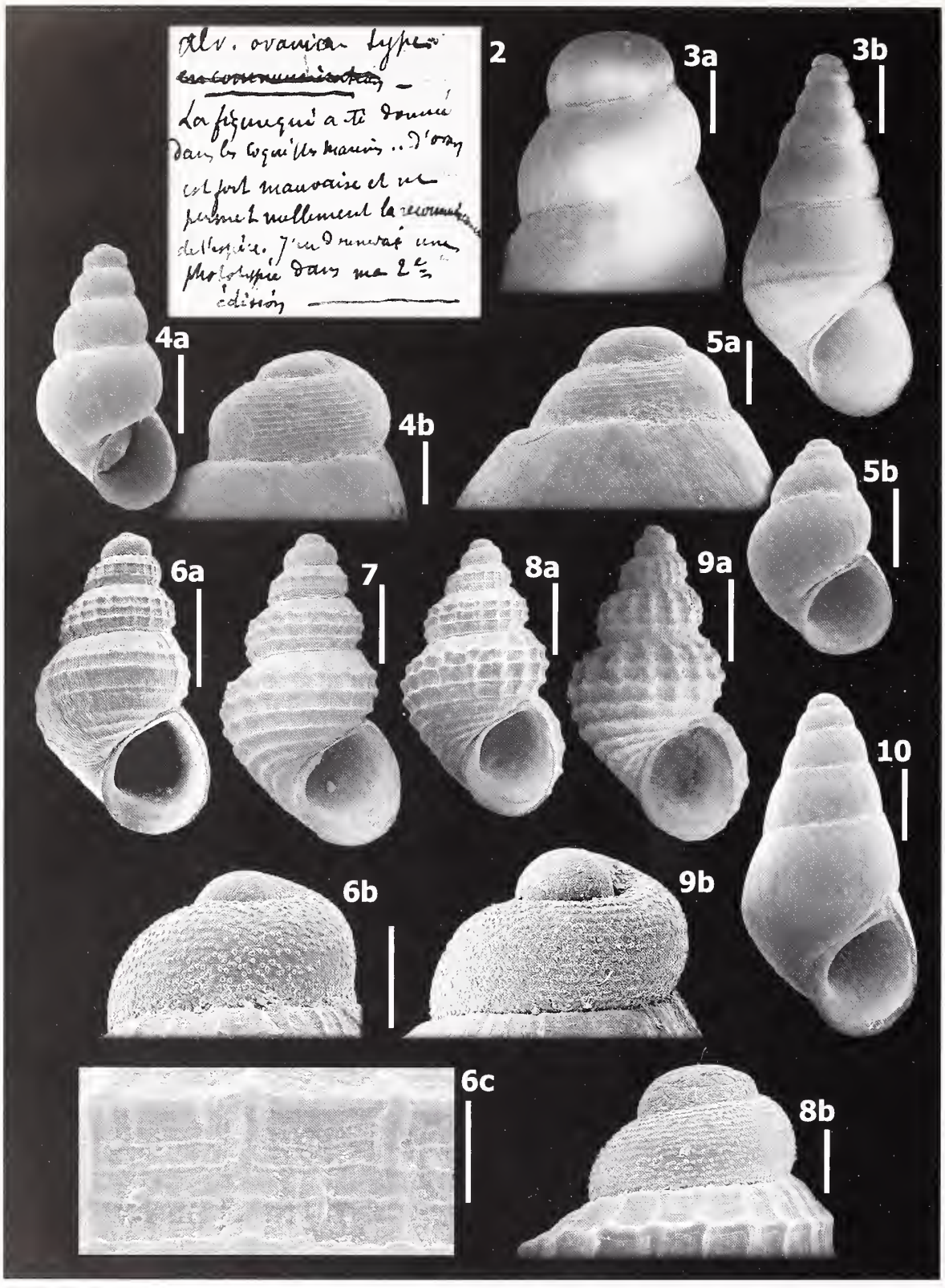
In the Mediterranean Sea, *Alvania sculptilis* seems confined to the Western basin, known with certainty from Southern Spain, Morocco and Algeria. It is common at Torres de Alcalá. GIANNUZZI-SAVELLI et al. (1997: 109, fig. 443) already recorded this species from Torres de Alcalá, but published a light photo of the shell, not accompanied by a SEM photo of the protoconch: that shell is not a typical example of *A. sculptilis* having a very wide aperture and large body whorl, but it seems to fall within the morphological range of this variable species.

Alvania tessellata (Weinkauff, 1868, ex Schwartz MS.)
(Figs. 11, 12, 13, 14)

Material examined

Alvania tessellata - material labelled as «*Alcidia spinosa*» by Monterosato has still not be found in the MTRS (lost ?); samples A, B, and D, more than 2 hundred of shs. (IN, LPT, MO, MP, RA, RR, RV, and SF colls.); sample C, 18 spms. (mostly young) (LPT, RV, and SF coll.); Fuengirola (South Spain), sediment 6 m, 7 shs. (AG, and RV coll.); Northern beach of Getares, Algeçiras (South Spain), beached sediment, 11 shs. (IN, and RR colls.). *Alvania pagodula* – some hundreds of shs./spms. in lots from sediment or brown algae of various localities of the Central Mediterranean Sea, in several colls.

Remarks - Within the lots from Cala Iris, there are both the typical form, with two spiral rows of knobs, and the form identified as *Alvania spinosa* (Monterosato, 1890) by some authors (e.g. PALLARY, 1902: 19; pl. I, figs. 12-13; 1920: 51; VAN AARTSEN, 1976; 1983; VAN AARTSEN, 1983: 8; 9, figs. I; VAN AARTSEN et al., 1984: 25; 113, fig. 110; GIANNUZZI-SAVELLI et al., 1997: 110, figs. 459-460). In fact, protoconch and teleoconch morphology of these forms are identical at all but one feature, i.e. the single row of knobs in *A. spinosa* vs. the couple of rows in *A. tessellata*. This difference seems at first glance to justify a specific separation. However, noticing shells with intermediate characters within the material from Cala Iris, it seems that there is a single variable species. The intermediates show a variable upper row, from moderately marked up to very weak. The upper row may also disappears at all on the body whorl just after a scarce rising. An intraspecific variation of the number of spiral cords (or rows of knobs) is displayed by other species of the genus *Alvania* Risso, 1826, being a not surprising phenomenon. VAN AARTSEN (1983: 8; unnumbered fig.) noticed also shells of *A. tessellata* with a weak third row of knobs, apparently on the body whorl, a feature not observed on the material from Cala Iris. Remarkably, the



Figs. 2: manuscript note by Pallary on his own *Alvania oranica*, sent to Monterosato (MTRS, box with no number). Figs. 3a-b: *Cassiella abylensis*, Gofas, sample D. Figs. 4a-b: *Setia slikorum* (Verduin), sample C. Figs. 5a-b: *Setia aartseni* (Verduin), sample D. Fig. 6a-c: *Alvania sculptilis* (Monterosato), form with weak sculpture, sample D (Fig. 6c: detail of teleoconch microsculpture); Fig. 7: idem, form with intermediate sculpture, sample D; Figs. 8a-b: idem, form with marked sculpture, sample D. Figs. 9a-b: *Alvania scabra* (Philippi), "Cock-Pit" submarine cave, Capo Palinuro (Southwest Italy), sediment 4-6 m. Fig. 10: *Cingula trifasciata* (J. Adams), sample D. Scale bars: 40 µm (Fig 6c); 100 µm (Figs. 3a, 4b, 5a, 6b, 8b, 9b); 500 µm (Figs. 3b, 4a, 5b, 6a, 7, 8a, 9a, 10).

closely related *Alvania pagodula* (B.D.D., 1884), which replaces *A. tessellata* in the Central Mediterranean waters, may show a form with a single row of knobs alongside the typical form with two rows (cf. Figs. 15, 16). In fact *Alcidia spinosa* Monterosato could be this less frequent form of *A. pagodula* with a single row of knobs. So far, I have still failed to trace any material labelled as «*Alcidia spinosa*» in the MTRS. However the above conclusion may be reasonably argued taking into account that *Alcidia spinosa* was originally referred to Pleistocene and Recent material from Sicily (MONTEROSATO, 1890: 147), instead of Lusitanic material.

Anyway, «*Alvania spinosa* (Monterosato)» sensu auctores seems to fall within the morphological range of *A. tessellata*, and it is confined to the Lusitanic area, as the typical form of *A. tessellata*, with a Mediterranean range restricted to Southern Spain, Morocco and Algeria. Therefore, the record from Ancona, Eastern Italy, in VAN AARTSEN (1983: 9, figs. I, the last two shells) seems actually problematic.

Cingula trifasciata (J. Adams, 1800)
(Fig. 10)

Material examined
Samples A, B, and D, 52 shs. + several frgs. (IN, LPT, MP, RA, RR, RV, SF, colls.); Punta Carnero, Algeçiras (South Spain), beached sediment, 8 shs. (IN coll.); Northern beach of Getares, Algeçiras (South Spain), beached sediment, 7 shs. (IN coll.). Torres de la Peña, Tarifa, (South Spain), beached sediment, 5 shs. (IN coll.); Cabo de Gata, Almería (South Spain), beached sediment, 2 shs. (RR coll.); Essaouira (Atlantic Morocco), beached sediment, 4 shs. (RR coll.); Vigo (Northwest Spain), beached sediment, 1 sh. (RR coll.); unspecified locality of East Eire, beached sediment, 7 shs. (RR coll.).

Remarks - The Mediterranean occurrence of the Atlantic gastropod *C. trifasciata* (J. Adams, 1800) [= *Cingula cingillus* (Montagu, 1803)] has been frequently regarded as doubtful (e.g. VAN AARTSEN et al., 1984: 19). In fact, some records from Mediterranean waters are debatable, as e.g. the record from Golfo di Napoli (Southwest Italy) by IDATO et al. (1983: tab. 1), or that from Tropea (Southwest Italy) by GIANNUZZI-SAVELLI et al. (1997: 95, fig. 344). On the other hand the species is known to inhabit the area around the Strait of Gibraltar (MONTEROSATO, 1889a: 34; D'ANGELO & GARGIULLO, 1978: 94; VAN AARTSEN et al., 1984: 19; 109, fig. 69; GIANNUZZI-SAVELLI et al., 1997: 95, fig. 345). Moreover, it has been recorded from Southern Spain, i.e. from Marbella and Fuengirola (BELLOCQ & NOFRONI, 1989: 227; 232, fig. 4), Malaga and Granada (LUQUE, 1986: 83). The occurrence of *C. trifasciata* in the Western Mediterranean basin is here confirmed. Despite I have not examined living specimens of *C. trifasciata* from Cala Iris, shells and fragments are not rare in the sediment. Cabo de Gata, lying on the Southern Spanish coast at about 300 km from the Strait of Gibraltar, is the easternmost locality of the Mediterranean Sea from where I have examined material of *C. trifasciata*.

Setia aartseni (Verduin, 1984)
(Figs. 5a-b)

Material examined
Samples A, B, D, 27 shs. + several frgs. (IN, LPT, RA, RV and SF colls.); sample C, 3 spms. (RV, and SF colls.); Northern beach of Getares, Algeçiras (South Spain), beached sediment, 9 shs. (IN, MP, and RR colls.).

Remarks - VERDUIN (1984: 45) did not list true Mediterranean material of this species. The closest locality he quoted is in the area of the Strait of Gibraltar, viz. Getares (South Spain). Also NICOLAY & ANGIOY (1994: 25; unnumbered fig.), and GIANNUZZI-SAVELLI et al. (1997: 89, figs. 302-303) pointed out the occurrence of *S. aartseni* in the Strait waters. Although *S. aartseni* is not common at Cala Iris, it seems to inhabit also the Western Mediterranean Sea.

Setia slikorum (Verduin, 1984)
(Figs. 4a-b)

Material examined
Samples A, B, C, some hundreds of shs. and frgs. (IN, LPT, MP, RA, RR, RV, and SF colls.); sample C, more than 2 thousand of spms. (LPT, RV, and SF colls.). Northern beach of Getares, Algeçiras (South Spain), beached sediment, 14 shs. (IN, and MP colls.).

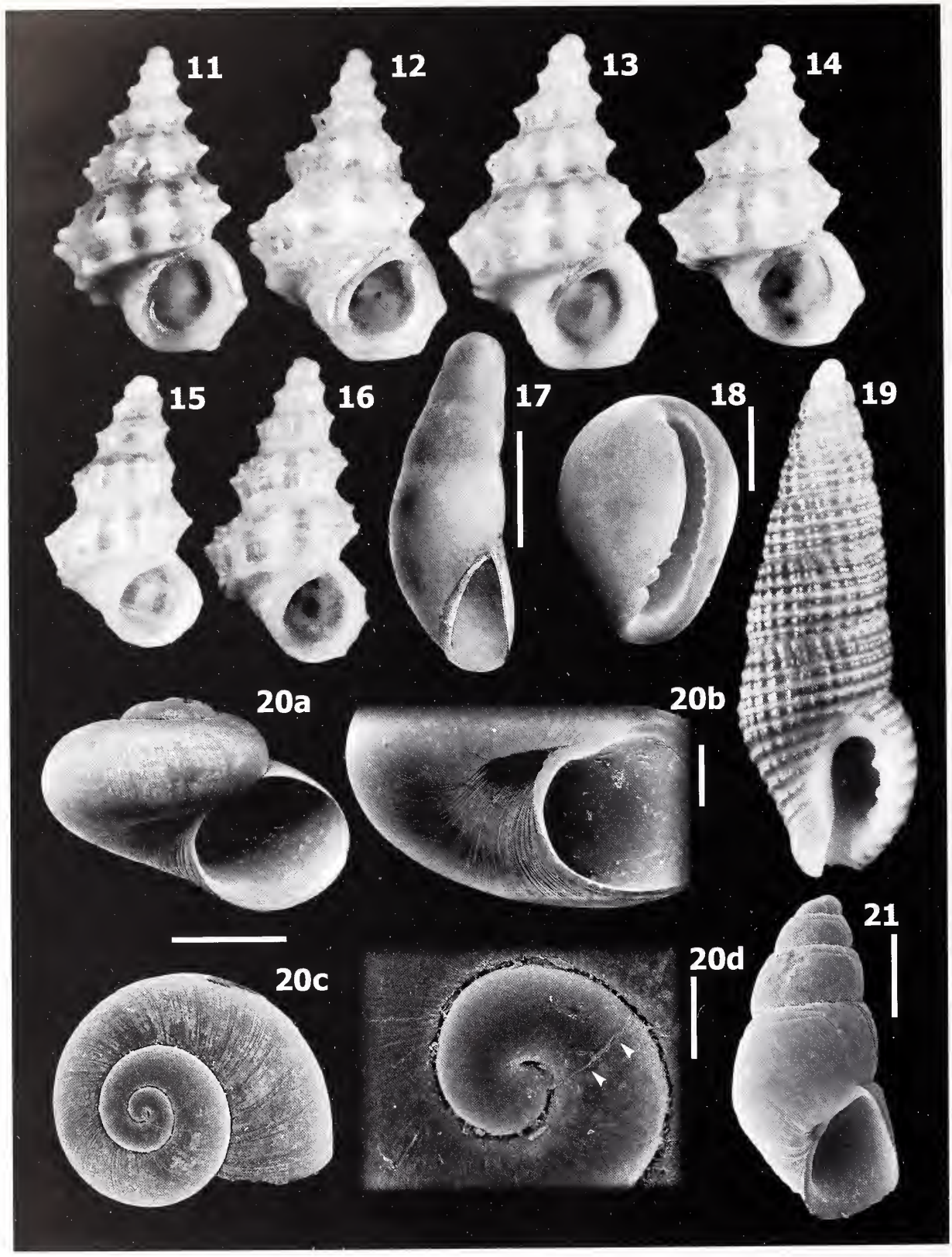
Remarks - As the previously mentioned species, VERDUIN (1984: 47, as «*Cingula sliki* sp. n.») did not record *S. slikorum* from any locality properly inside the Mediterranean waters (see also GIANNUZZI-SAVELLI et al., 1997: 91, figs. 320-321; NICOLAY & ANGIOY, 1994: 25; unnumbered fig.). At Cala Iris *S. slikorum* is syntopic with *Setia amabilis* (Locard, 1886) on brown algae. They are abundant, the most frequent rissoid species in the samples: I have examined a myriad of dry specimens and shells of both species.

Familia EULIMIDAE H. Adams & A. Adams, 1853

Vitreolina cionella (Monterosato, 1878)
(Fig. 17)

Material examined
Sample A, 1 sh. (LPT coll.); Chafarinas Is. (Mediterranean Morocco), sediment 120 m, 1 sh. (IN coll.); "Cock Pit" submarine cave, Capo Palinuro (Southwest Italy), sediment 4-6 m, 1 sh. (lost); "Spiaggia della Speranza" beach, Alghero (Northwest Sardinia), sediment 4-6 m, 1 sh. (LPT coll.); Cannitello, Villa San Giovanni (Southwest Italy), sediment 30 m, 1 sh. (LPT coll.).

Remarks - In a previous paper (TRINGALI, 1996) I have already recorded a single shell from Cala Iris. The same shell is here



Figs. 11-14: *Alvania tessellata* (Weinkauff), from the form with evident upper row of knobs, to the form without upper row, respectively from samples B, A, A, and A, (h.: 3.6; 3.6; 3.8; and 3.5 mm). Figs. 15-16: *Alvania pagodula* (B.D.D.), with either one or two rows of knobs, Gaeta, Latina (West Italy), on brown algae 2 m (h.: 2.7, and 3.0 mm). Fig. 17: *Vitreolina cionella* (Monterosato), sample B (SEM photo on uncoated sample). Fig. 18: *Granulina vanhareni* (van Aartsen, Menkhorst & Gittenberger), sample D. Fig. 19: *Chauvetia* cf. *retifera* (Brugnone), sample B (h.: 10.7 mm). Figs. 20a-d: *Hyalogyra zibrowii* Warén, sample D (arrows point to the protoconch/teleoconch scar). Fig. 21: *Brachystomia improbabilis* (Oberling), sample D. **Scale bars:** 100 µm (Fig. 20d); 200 µm (Fig. 20b); 400 µm (Fig. 17); 500 µm (Figs. 18, 20a, 20c, 21).

SEM figured (uncoated shell). Note that the shell figured by GIANNUZZI-SAVELLI et al. (1997: 105, fig. 297) as collected at «Al Hoceoma» (sic: = "Al Hoceima") is actually a second shell found at Cala Iris, sample A (CS coll.; Carlo Smriglio, personal communication). This minute species is uncommon, but it is known for the whole Mediterranean Sea (GAGLINI, 1992; TRINGALI, 1996).

Familia BUCCINIDAE Rafinesque, 1815

***Chauvetia* cf. *retifera* (Brugnone, 1880)**
(Fig. 19)

Material examined
Chauvetia cf. *retifera* – the holotype of *Lachesis retifera* has still not be found in the MTRS (lost ?); sample B, 1 sh. (RV coll.); Fuengirola, Malaga (South Spain), sediment 2 m, 2 shs. (IN coll.). *Chauvetia lefebvrei* – sample A, and D, 3 shs. (LPT, and RA coll.); "Isola delle Correnti" beach, Capo Passero (Southeast Sicily), sediments 18 m and 25 m, 5 shs. (RR coll.); Capo Passero, Siracusa (Southeast Sicily), sediments 15 and 25 m, 3 shs. (RR coll.); Favignana Is. (Egadi Islands), sediment 2 m, 2 shs. (RV coll.); Levanzo Is. (Egadi Islands), sediment 21 m, 1 sh. (RR coll.); "Cattedrale II" and "Cock Pit" submarine caves, Capo Palinuro (Southwest Italy), sediments 17 m and 4-6 m, 41 shs. (LPT, RA and MP colls.); Sant'Antioco, Cagliari (South Sardinia), beached sediment, 3 shs. (RR coll.).

Remarks - Here Brugnone's name is tentatively adopted for the species usually named *Chauvetia pellisphocae* (Reeve, 1845). *Pleurotoma pellisphocae* cannot actually apply to the present species, being a West Indian turrid (Referee communication, basing on the type material in the NHML). BRUGNONE (1880: 111; pl. I, fig. 6) described and figured *Lachesis retifera* on a fossil shell (holotype) from Giannettello, near Caltanissetta (Sicily). Although he considered *L. retifera* as coming from a Pliocene deposit, this is arguably a Pleistocene fossil. MONTEROSATO (1884: 793; 1889b: 117) adopted the name for a Recent *Chauvetia* species from the Atlantic coasts of Morocco and Spain, which could match «*Chauvetia pellisphocae*» sensu auctores. On the other hand, PALLARY (1902: 13) doubted of the synonymy of *Chauvetia retifera* and the so-called *Chauvetia pellisphocae*.

The MTRS includes the Brugnone coll., but I have so far failed to find there the holotype or further material hand labelled as «*Lachesis retifera*» by Brugnone or Monterosato. An evident disorder affects all the drawers which should contain the material of *Chauvetia* together with the turrids, like many other drawers in the MTRS. MICALI (1999: 59-60) listed *Lachesis retifera* among the synonyms of *Chauvetia pellisphocae*, but this conclusion seems simply based on the original description of *L. retifera*, and on Monterosato's opinion, rather than on original material of Brugnone. In fact, he did not mention the holotype or other material of *L. retifera* from the MTRS in the note on *Chauvetia pellisphocae* (MICALI, 1999: 59-60). It is thus possible that the holotype of *L. retifera* is lost. Noteworthy, *Folineaea dolioliformis* MONTEROSATO, 1884 (: 793), is an unavailable name, being originally published as a synonym of *Lachesis retifera* (ICZN, 1999: Art. 11.6), and the infrasubspecific names of varieties by MONTEROSATO (1889b: 117), as such are unavailable too (ICZN, 1999: Art. 45). *Chauvetia elongata* F. Nordsieck & García-Talavera, 1979 (NORDSIECK & GARCÍA-TALAVERA, 1979: 141; pl. XXXIII, fig. 4), based on Canarian material, is possibly at disposal for this species, and should be checked, but the name by Brugnone is older, and was introduced by an original description and a figure which fit the present species. Therefore I prefer provisionally to adopt this latter name.

SABELLI et al. (1990-1992: 399) regarded as doubtful the occurrence of this gastropod in the Mediterranean Sea. Quoted as either *retifera* or *pellisphocae*, it is recorded from several localities of the Atlantic coast of Morocco: Tanger, Casablanca, Magazan, Mogador (= Essaouira), and Agadir (MONTEROSATO, 1884: 793; 1889b: 117; DAUTZENBERG, 1917: 66; PALLARY, 1920: 42; unnumbered pl., fig. 9; PASTEUR-HUMBERT, 1962: 87; NORDSIECK, 1976: 4). Also, the record of *C. pellisphocae* from the Bay of Algeçiras, Spain, by VAN AARTSEN et al. (1984: 36; 118, fig. 173) is not properly Mediterranean. As noticed by VAN AARTSEN et al. (1984: 36) the shell figured by ROLÁN (1983: 242, fig.219) as *Chauvetia lefebvrei* (Maravigna, 1840) from Vigo (Northwest Spain), actually belongs to «*Chauvetia pellisphocae*» sensu auctores, and this is a further Atlantic record. Also MONTEROSATO (1884: 793; 1889b: 117) had quoted this species for Vigo, as well as from Gibraltar and the Asturias. Recently MICALI (1999: 59, as «*Chauvetia pellisphocae*») recorded it from Ceuta, Algeçiras and Fuengirola (Malaga), the latter being a fully Mediterranean locality.

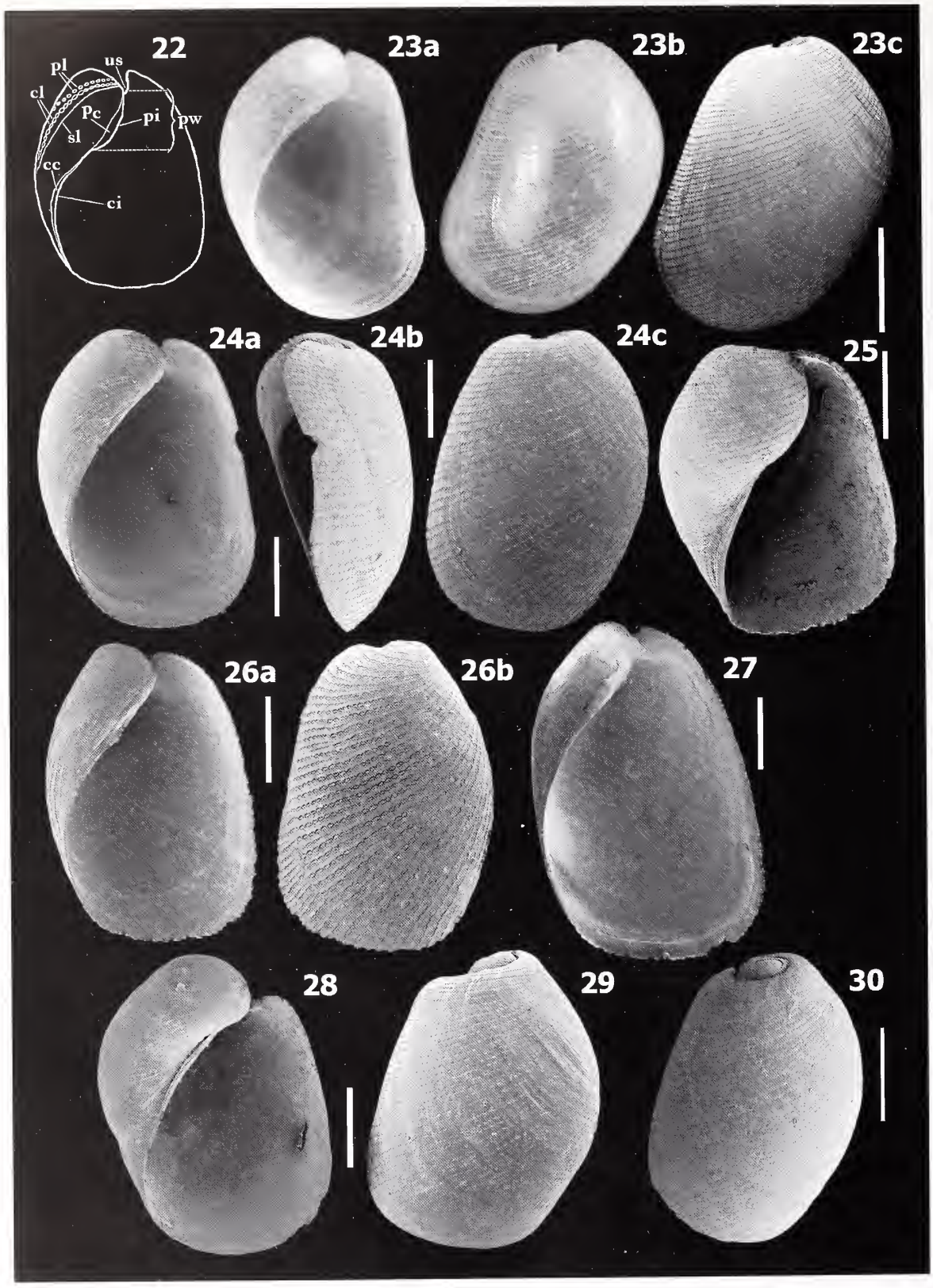
The finding from Cala Iris is a further record of this species inside the Western Mediterranean waters. The examination of the samples of sediment showed also the occurrence of *C. lefebvrei*, which is a similar, but clearly distinct species (see, e.g., MICALI, 1999: 59; 54, figs. 7, 12).

Familia MARGINELLIDAE Fleming,1828

***Granulina vanbareni* (van Aartsen, Menkhorst & Gittenberger, 1984)**
(Fig. 18)

Material examined
Samples A, B, and D, 2 spms. (partially preserved) + 13 shs. (IN, LPT, MP, RA, RR, and SF colls.); Punta Carnero, Algeçiras (South Spain), beached sediment, 1 sh. (LPT coll.). Northern beach of Getares, Algeçiras (South Spain), beached sediment, 18 shs. (IN, LPT, RR, and RV colls.).

Remarks - Described from the Bay of Algeçiras (VAN AARTSEN et al., 1984: 40-41; 121, fig. 200), this species has been discussed in the review of the Mediterranean and Northeast Atlantic species of the genus *Granulina* Jousseuame, 1888, by GOFAS (1992: 21-23), considering its range confined strictly around the Strait of Gibraltar.



Figs. 22-30: ***Philine*** shells - Fig. 22: *Philine* schematic shell, in order to define some terms: **cc**: columellar (portion of the) callus; **ci**: columellar (portion of the) inner lip; **cl**: catenoid line (= chain-like row of pits); **pc**: parietal (portion of the) callus; **pi**: parietal (portion of the) inner lip; **pl**: pitted line (= row of loose pits); **pw**: penultimate whorl; **sl**: simple line (= line not made by pits); **us**: upper sinus. **Figs. 23a-c**: *P. iris* n. sp., holotype (ZMR), sample D (h.: 2.8 mm) (Figs. 23a-23b: light photos; Fig. 23c: SEM photo on uncoated sample). **Fig. 24a-c**: idem, paratype (ZMR), sample D. **Fig. 25**: *P. condensa* van der Linden, Palermo (Sicily), unrecorded depth (MTRS, box 16129). **Figs. 26a-b**: *P. catena* (Montagu), sample D. **Fig. 27**: idem, Siracusa (East Sicily), unrecorded depth. **Fig. 28**: *P. punctata* (J. Adams), Golfo di Napoli (Southwest Italy), unrecorded depth. **Fig. 29**: idem, same data of Fig. 28. **Fig. 30**: idem, Nettuno, Roma (West Italy), beached sediment. **Scale bars:** 500 µm (Figs. 23a-b, 24a-c, 25, 26a-b, 28, 29, 30); 1.0 mm (Figs. 23c, 27).

Although *G. vanbareni* is not common within the material of Cala Iris, it is present in all the samples of sediment, and 2 badly preserved specimens where found.

Subclassis HETEROBRANCHIA J.E. Gray, 1840
Familia HYALOGIRINIDAE Warén & Bouchet, 1993

***Hyalogyra zibrowii* Warén in Warén, Carrozza & Rocchini, 1997**
(Figs. 20a-d)

Material examined
Sample A, 1 sh. + 1 frg.; sample D, 5 shs. (LPT, MP colls.).

Remarks - The original description of this heterobranch gastropod was based on empty shells from a submarine cave of the Hyéres Islands, South France (WARÉN et al., 1997: 60-61; 66, figs. 17-20). The shells from Cala Iris are white opaque, their teleoconchs showing a somewhat silky shine, whereas the protoconchs are still translucent, with a nearly vitreous appearance. The shell of *H. zibrowii* was described as transparent, but the material from Cala Iris could possibly lose its original shine by lying in the sediment. The other shell features fit completely the morphology of *H. zibrowii*.

Familia PYRAMIDELLIDAE J.E. Gray, 1840

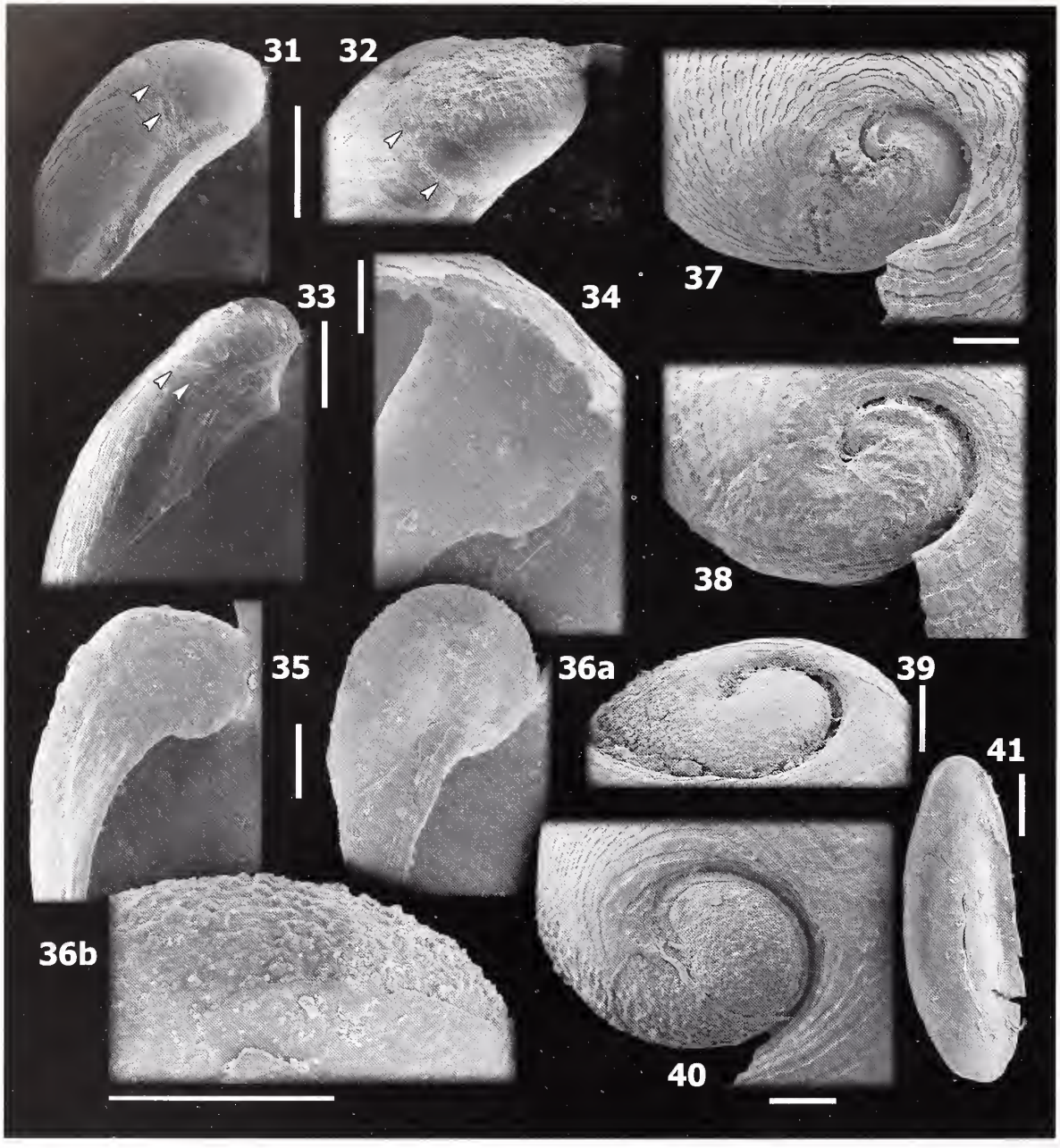
***Brachystomia improbabilis* (Oberling, 1970) [n. comb.]**
(Fig. 21)

Material examined
Brachystomia improbabilis - the type material of *Odostomia improbabilis* was not found in the NHMB, and it is apparently lost; "Plage de La Franqui" beach, Aude Department (South France), rest of the sample of beached sediment originally containing the type material (Oberling & Gerber legerunt, March 18th, 1966), 2 shs. (NHMB); sample D, 1 sh. (LPT coll.); Campomarino, Taranto (Southeast Italy), sediment 6 m, 3 shs. (LPT, and SF coll.); Torre Astura, Roma (West Italy), beached sediment, 1 sh. (LPT coll.); " Secche di Tor Paterno" shoal, Roma (West Italy), sediment 15, and 20-25 m, 9 shs. (IN and RR colls.); Santa Marinella, Roma (West Italy), *Posidonia oceanica* residuals from fishing nets, 1 spm. (LPT coll.); Santa Marinella, Roma (West Italy), sediment 16-22 m, 4 shs. (IN, and RR colls.); Capo Linaro, Roma (West Italy), sediment 14-17 m, 1 sh. (RR coll.); Bagni di Sant'Agostino, Civitavecchia (West Italy), beached sediment, 3 shs. (IN, and RR colls.); Procida Is., Napoli (Southwest Italy), sediment 4 m, 1 sh. (RR coll.). *Brachystomia striolata* – samples A, B and D, 5 shs. (LPT, RR and SF colls.); Soguksu, Aydincik (South Turkey), sediment 10 m, 2 shs. (LPT coll.); Palaiokhóra (Crete Is.), sediment 10 m, 5 shs. (LPT, and SF colls.); Lampedusa Is. (Sicily Canal), sediments 18 m and 30 m, 6 shs. (IN, LPT, and RR coll.); Ponza Is. (Pontine Islands, West Italy), sediment 35 m, 2 shs. (RR coll.); "Secche di Tor Paterno" shoal, Roma (West Italy), sediments 22-30 m, and 31 m, 5 shs. (RR coll.); Civitavecchia (West Italy), sediment 100 m, 2 shs. (RR coll.); Argentarola Is. (Tuscan Islands), sediment 55 m, 4 shs. (LPT coll.); Giannutri Is. (Tuscan Islands), sediments 48 and 54 m, 9 shs. (LPT, and RR colls.); Giglio Is. (Tuscan Islands), sediment 32 m, 4 shs. (RR coll.); L'Île Rousse (Northwest Corse), sediment 7 m, 1 sh. (RV coll.).

Remarks - AMATI (1987) noticed that *Odostomia improbabilis* Oberling, 1970, is the same as *Odostomia verduini* van Aartsen, 1987. Although neglected in literature, the name by Oberling is the oldest available for this species (ICZN, 1999: Art. 23). On the other hand, PEÑAS & ROLÁN (1999: 88) rejected the synonymy of *O. verduini* and *O. improbabilis*, regarding the latter name as proposed in a conditional way by OBERLING (1970), and therefore invalid (ICZN, 1999: Art. 15.1). Arguably, they refer to this sentence in the original description: «Il est probable qu'il s'agit là d'une nouvelle espéce». However, as remarked by AMATI (1987), this sentence seems an evident expression of sincere modesty by the Swiss author, rather than a doubt on the validity of the new species. Thus, I prefer to share Amati's opinion and regard *Brachystomia improbabilis* (Oberling, 1970), as a valid, available new combination. The names of new species introduced by J.-J. Oberling have been overlooked by most malacologists in these thirty years, although some of them are to adopt on account of the law of priority. Marco Oliverio ("La Sapienza" Roma University) and the writer are working on a revision of the species described by Oberling, based on the types (NHMB), considering that Oberling's systematic work, although episodic, ought to be restored in its own merits.

The shell of this species is mainly characterised by a marked subsutural furrow (OBERLING, 1970: 5), deeper than on the similar *Odostomia striolata* Forbes & Hanley, 1850. Evident spiral lines usually run the whole teleoconch surface of the latter, whereas the spiral lines are faint on *O. improbabilis*. The prosocline, very oblique and flexuous growth lines of *O. improbabilis* are quite characteristic. I consider that the close resemblance with *Brachystomia eulimoides* (Hanley, 1844), and the other species of *Brachystomia* Monterosato, 1884 - type species: *Odostomia rissoides* Hanley, 1844 (= *O. scalaris* McGillivray, 1843), subsequent designation by CROSSE (1885: 141) - make both *Odostomia improbabilis* and *Odostomia striolata* as members of this genus, even basing on the shell morphology alone. Thus, I propose as new combinations both *Brachystomia improbabilis* (Oberling, 1970) and *Brachystomia striolata* (Forbes & Hanley, 1850).

Brachystomia improbabilis inhabits the whole Mediterranean Sea. It is known from southern Spain (VAN AARTSEN, 1987: 5; PEÑAS et al., 1996: 54; 49, figs. 125-126), and the neighbouring Atlantic waters (VAN AARTSEN et al., 1998; PEÑAS & ROLÁN, 1999: 87-88; fig. 233), thus, it is not surprising to find it also along the Mediterranean coast of Morocco. This species, however, seems rare at Cala Iris: I examined a single shell from the sediment.



Figs. 31-40: ***Philine*** **protoconchs** - **Fig.** 31: *P. catena* (Montagu), sample D, lateral view. **Fig.** 32: *P. iris* n. sp., paratype (ZMR), sample A, lateral view; **Fig.** 33: *P. intricata* Monterosato, sample D, lateral view; **Fig.** 34: *P. iris* n. sp., sample D, lower view of a broken shell; **Fig.** 35: *P. catena* (Montagu), sample D, lower view; **Fig.** 36a: *P. punctata* (J. Adams), Palmaiola Is., near Elba Is. (Tuscan Islands), sediment 24 m, lower view; **Fig.** 36b: idem, detail of the apical sculpture; **Fig.** 37: *P. catena* (Montagu), sample D, upper view; **Fig.** 38: *P. iris* n. sp., paratype (ZMR), sample D, upper view; **Fig.**39: *P. punctata* (J. Adams), Nettuno, Roma (West Italy), beached sediment, upper view; **Fig.** 40: idem, Palmaiola Is. (Tuscan Islands), sediment 24 m, upper view. **Fig.** 41: *P. intricata* Monterosato, sample A, (paired ?) gizzard plate. Arrows point to the protoconch/teleoconch scar. **Scale bars:** 100 µm (Figs. 34, 35, 36a-b, 37, 38, 39, 40); 200 µm (Figs. 31, 32, 33, 41).

Subclassis OPISTHOBRANCHIA Milne-Edwards, 1848
Familia PHILINIDAE J.E. Gray, 1850

Philine intricata Monterosato, 1884
(Figs. 33, 41, 48, 49a-b)

Material examined
Type material: Palermo (Northwest Sicily), 28 shs. + several frgs. (syntypes) (MTRS, box 16301); sample A, 1 partially preserved spm. (MP coll.); samples B, and D, 4 shs. (LPT coll.); Northern coast of Astipálaia Is. (Cyclades Islands), brown algae 4-5 m, 1 sh. (RV coll.); Palaiokhóra (Crete Is.), sediment 10 m, 1 sh. (LPT coll.); "Isola dei Conigli" beach, Lampedusa Is. (Sicily Canal), beached sediment, 1 sh.; Sorrento, Napoli (Southwest Italy), 50-60 m, 2 shs. (IN coll.); Napoli (Southwest Italy), unrecorded depth, 1 sh. (MTRS, box 16301); Santa Mari-

nella, Roma (West Italy), sediment 25 m, 3 shs. (IN coll.); Capo Vita, Elba Is. (Tuscan Islands), sediment 40 m, 1 sh. (LPT coll.); Palmaiola Is., (Tuscan Islands), sediment 24 m, 2 shs. (LPT coll.); "Spiaggia della Speranza" beach, Alghero (Northwest Sardinia), sediment 4-6 m, 1 sh. (LPT coll.); Punta Carnero, Algeçiras (South Spain), beached sediment, 1 sh. (IN coll.); Northern beach of Getares, Algeçiras (Southern Spain), beached sediment, 4 shs. (IN coll.); Torres de la Peña, Tarifa, (South Spain), beached sediment, 3 shs. (IN coll.); 30 km South of Rabat (Atlantic Morocco), beached sediment, 4 shs. (IN coll.); El Aaiúm (West Sahara), unrecorded depth, stomach contents of flatfishes, 2 shs. (IN coll.); El Poris, Tenerife Is. (Canary Islands), sediment 20 m, 1 sh. (LPT coll.); Lueva de Las, Corvinas (Tenerife Is.) 27 m, 1 sh. (LPT coll.); Punta Blanca, Puerto Santiago (Tenerife Is.), sediment 30 m, 7 shs. (LPT coll.); St. Raphael Is. (Azores Islands), 50 m, 2 shs. (MTRS, box 16301).

Remarks - The malacological literature has overlooked this small philinid gastropod until the recent works by GAGLINI (1991: 12-13; 20, unnumbered figs.), and VAN DER LINDEN (1994: 41-42; figs. 1-2; 44, figs. 3-6), which carefully described and figured the shell, GAGLINI (1991) publishing also the photo of a syntype. More recently, the type material of *P. intricata* in the MTRS (box 16301) has been documented by OLIVERIO & TRINGALI (2001). The records in the literature show the occurrence of *P. intricata* in the Western and Central Mediterranean Sea, as well as in the Northeast Atlantic (MONTEROSATO, 1875: 47; 1878: 111; 1917: 27; SYKES, 1905: 324; LOCARD, 1905: 35; GAGLINI, 1991; VAN DER LINDEN, 1994; 1995: 73-74; MORENO & TEMPLADO, 1998: 44). Here the species is recorded also for the Eastern Mediterranean basin, namely from Crete Is., and Astipálaia Is. (Cyclades) (Figs. 49a-b) (see above the Material examined).

The smallest shells found in the samples B and D are more square-shaped than the largest ones, as e.g. the syntype figured by GAGLINI (1991), the latter being broader toward the base. This is, however, characteristic of philinid shells: large, full-grown shells show a less even outline, are larger toward the base than the smallest ones (probably young or subadults), shrinking toward the top, frequently with a weak recess just above a half of the height. The other features of the Moroccan shells fit *P. intricata* morphology at all.

Coarse knobs, randomly arranged, sculpture the protoconch of *P. intricata*, whose shape is difficult to define: the general look of the protoconch is hammered-like, suggesting an unfinished sculpture. This kind of sculpture is not characteristic of *P. intricata* alone: it may be noticed also on some congeneric species, although usually less coarse (cf. the following note). Further species of *Philine*, e.g. *Philine aperta* (Linné, 1767), *Philine quadrata* (S.V. Wood, 1839), *Philine monterosati* Monterosato, 1874, ex Jeffreys MS., display smooth protoconchs with more whorls.

Nothing is reported about the external morphology of the animal, its anatomy and/or ecology. However it is remarkable that the shell figured as «*Philine catena* (Montagu, 1803)» by VAYSSIÉRE (1885: pl. 1, fig. 26) is actually *P. intricata*, as shown by the characteristic fold on the columella. Therefore, the few anatomical characters noticed on his material should be ascribed to the latter, rather than to *P. catena*. Anyway, the gizzard plate figured by VAYSSIÉRE (1885: pl. 1, fig. 30) seems to match that figured herein (Fig. 40), obtained from the specimen of the sample A (shell height = 2 mm ca.). Such a specimen was nearly destroyed within the sediment, reduced to few dry remains, aggregated with debris. Thus, I succeeded in recovering the figured plate only. It is evenly straight and slender in shape, with a protuberance on the middle of the inner surface, whitish coloured, with a light brown conchiolin layer more evident on the edges. It seems composed by calcareous substance, but it has not been submitted to any chemical test.

Along with *P. intricata*, very few shells and/or fragments of the following philinid species were found within the samples of sediment: *P. angulata* Jeffreys, 1867, *P. aperta* (Linné, 1767), *P. catena* (Montagu, 1803), *P. denticulata* (J. Adams, 1800) including also 2 dry, badly preserved specimens (sample D), *P. punctata* (J. Adams, 1800), and an undescribed species. This latter is the commonest *Philine* in the samples, and although similar to both *P. punctata* and *P. catena*, it is clearly distinct. It is herein described as new.

Systematic position

Ordo Cephalaspidea P. Fischer, 1883 :
Superfamilia Philinoidea J.E. Gray, 1850 :
Familia Philinidae J.E. Gray, 1850 :
Genus *Philine* Ascanius, 1772 :

Philine iris n. sp.

(Figs. 23a-c, 24a-c, 32, 34, 38, 42, 43)

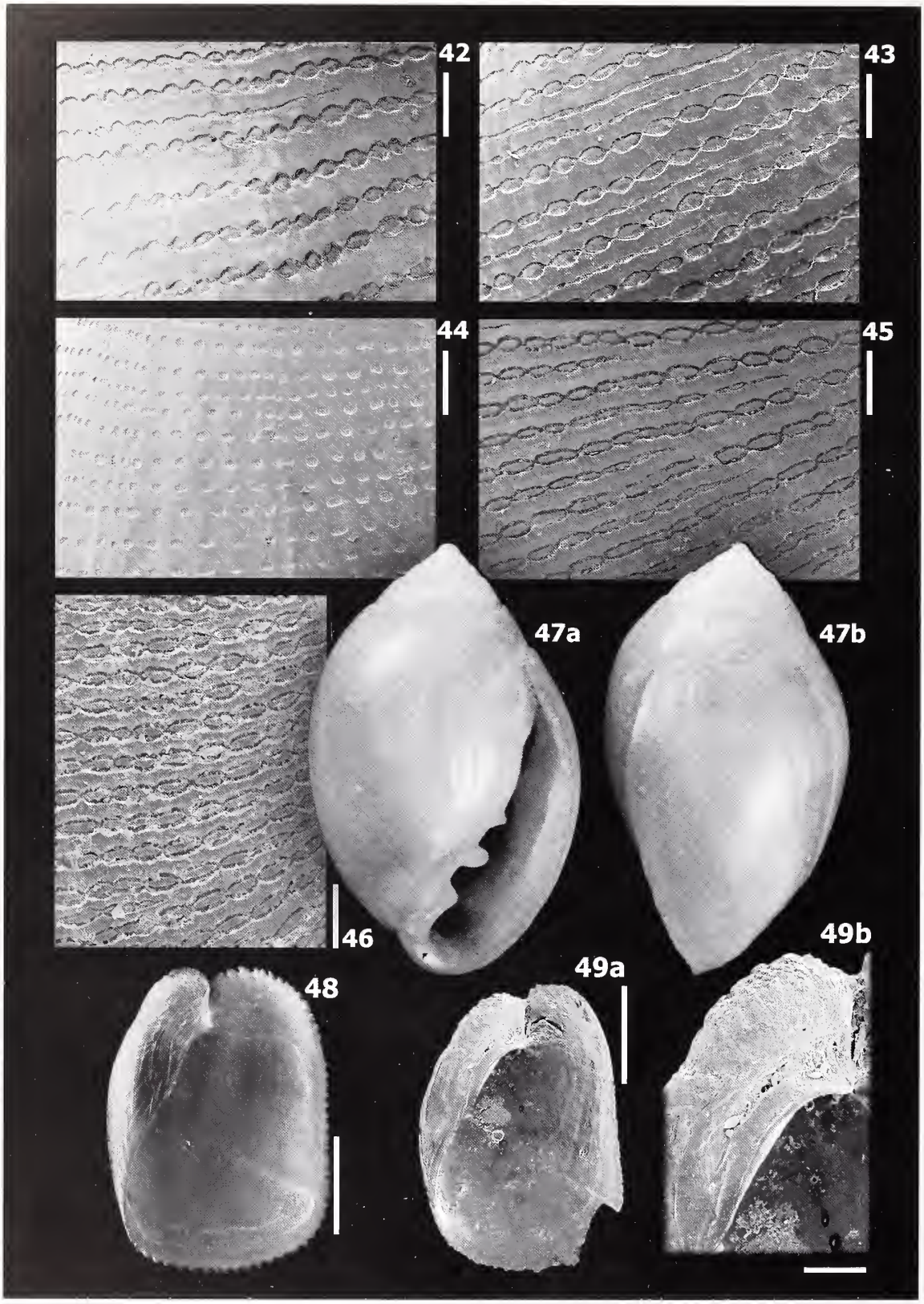
Type material - The holotype and 28 paratypes (complete shells or damaged ones, yet easy to identify) from Cala Iris (type locality), Torres de Alcalá (Mediterranean Morocco), 2-10 m, deposited as follow:

public collections - holotype + 3 paratypes: ZMR; 2 paratypes: MNHN; 2 paratypes: NHML; 2 paratypes: SMNH; 2 paratypes: ZMB; 2 paratypes: ZMUC; private collections - 1 paratype: IN; 2 paratypes: LPT; 1 paratype: MP.

Furthermore there are 10 paratypes provisionally recovered in the LPT coll., at disposal of Public Scientific Institutions, which will ask for them.

Material examined

Philine iris - the type material + 12 damaged shs. from the samples A, B, and D; 1 sh. labelled as «*Philine* Nizza ?» by Monterosato, thus possibly from Nice, South France (MTRS). *Philine catena* – more than 1 hundred of shs. within lots coming from the whole Mediterranean range of the species, in several colls.; "Simius" beach, Villasimius (Southeast Sardinia), brown algae 2-3 m, 2 spms. (LPT coll.); unspecified locality, England (U.K.), 2 shs. (MTRS). *Philine punctata* - sample D, 2 shs. (LPT



Figs. 42-46: ***Philine*** details of sculpture from about a half of the body whorl – Fig. 42: *P. iris* n. sp., paratype (ZMR), sample D; Fig. 43: idem, holotype (ZMR), sample D; Fig. 44: *P. punctata* (J. Adams), Golfo di Napoli (Southwest Italy), unrecorded depth; Fig. 45: *P. catena* (Montagu), sample D; Fig. 46: idem, Soguksu, Aydincik (South Turkey), *Posidonia oceanica* sediment 9 m. Figs. 47a-b: *Pseudomelampus kochi* (Pallary), sample A (h.: 4.8 mm). Fig. 48: *P. intricata* Monterosato, sample D. Figs. 49a-b: idem, Southern coast of Astipálaia Is. (Cyclades Islands), empty shell within brown algae 2-3 m. Scale bars: 100 µm (Figs. 42, 43, 44, 45, 46; 49b); 400 µm (Fig. 48, 49a).

coll.); Capo San Vito (Northwest Sicily), unrecorded depth, 2 shs. (MTRS, box 16302); Golfo di Napoli (Southwest Italy), unrecorded depth, 11 shs. + some frgs. (MTRS, box 16322); Nettuno, Roma (West Italy), beached sediment, 2 shs. (IN coll); Palmaiola Is. (Tuscan Islands), sediment 24 m, 2 shs. (LPT coll.); Capo Vita, Elba Is. (Tuscan Islands), sediment 40 m, 1 sh. (LPT coll.); (Pleistocene ?) fossil deposits of Ficarazzi, Palermo (Northwest Sicily), 1 sh. (MTRS, box 16304); Shetland Islands (U.K), unrecorded depth, 2 shs. (MTRS, box 16302)); unspecified locality, England (U.K), unrecorded depth, 2 shs. (MTRS, box 16302). *Philine condensa* - Palermo (Northwest Sicily), unrecorded depth (probably circalittoral muddy bottom), 4 shs. + 2 frgs. (MTRS, box 16129, labelled «Pal. 1880» by Monterosato). *Philine arenosa* – El Aaiún (West Sahara), 50-60 m, stomach contents of a flatfish, 1 sh. (IN coll.).

Type locality - Cala Iris, Torres de Alcalá (= "Torres el Kal'a", 35°10' N, 04°19' W - Fig. 1).

Description - (Fig. 22 shows some terms hereby employed). Typical philinid shell, thin, translucent, very small, usually with height = 1.7-2.0 mm, and width = 1.2-1.5 mm (the holotype attains the largest size: h. = 2.8 mm, w. = 2.3 mm), moderately slender (h./w. = 1.17-1.35). The outline of young and subadult shells is more evenly egg-shaped than that of adult ones. The largest shells are more oblique, and broader toward the base, slightly shtinking just above a half of the shell height. Protoconch diameter 300 µm ca.; the protoconch is partially concealed by the body whorl, and it cannot be observed from a lateral side on adult shells; in early post-metamorphic shells the scar between protoconch and teleoconch is evident. As previously noticed for *P. intricata*, the appearance of the protoconch upper surface is reminiscent of an unfinished sculpture: the apical sculpture consists of coarse granules, randomly arranged, close set on the upper patt of the protoconch, whereas the lower part is quite smooth. The large aperture, characteristic of *Philine*, is somewhat oblique, very wide and quite rounded below, resttaining toward the top. The body whorl is very large, somewhat slender, with moderately straight sides toward the top. Laterally observed it is evenly rounded, but not very swollen, having its maximum dpt. slightly below a half of the height. The height of the penultimate whorl is about 1/4-1/5 of the shell height. The columellar callus is thin. The contour of the internal lip is rather flexuous, both its columella and parietal parts being remarkably and evenly arched. The peristome is weakly serrate, and the notches are more evident on the upper edge of the peristome. The peristome is mote ot less protruding above the shell top on most shells. Joining the penultimate whorl, the peristome makes a narrow upper sinus. Latetally observed it is prosocline and flexuous, with an evident recess in the middle. The growth lines, similar in shape to the peristome, are barely marked, and prosocline. The surface is also sculptured by small pits, well marked, moderately oblong in shape, with a major diameter of 29-47 µm, and a minor diameter of 17-29 µm ca. They are linked into chain-like rows, or "catenoid lines", which run on the whole teleoconch surface. On the body whorl of the holotype there are 65 catenoid lines, whereas on average-sized shells (2 mm of height ca.) they are about 50-55. Each spiral line starts as a flexuous simple line, gradually attaining a chain-like look; therefore some simple lines are scattered among the catenoid lines. The external morphology of the living animal, as well as anatomical and/or ecological features are unknown (but see below, the Remarks).

Distribution - *Philine iris* is so far known with certainty only from the type locality, with some doubts about its possible presence in the waters of Nice (South France). Nevertheless, Ceuta and the localities of the South Spain quoted by Moreno & Templado (1998: 45) for «*Philine* sp.» possibly belong to the range of the new species, as perhaps the Maltese Islands (see Remarks below). Probably it inhabits muddy and sandy bottoms in continental shelf waters.

Etymology - The name of the type locality (Cala Iris, viz. "Iris Cove") inspired the name of the new species.

Remarks - As previously noticed, the holotype is the largest shell of *P. iris* in the lot of Cala Iris. As typical of full-grown philinid shells it is broader toward the base, with a weak, but evident recess at about a half of the height, and shows a more oblique outline than the smaller shells.

The small-average size paratypes seem to match with the «*Philine* sp.» recorded by Moreno & Templado (1998: 45; 42, fig. 3; 47 figs. 15-20) for South Spain and Ceuta. If this is right, as I am inclined to think, the external morphology of the animal, and radular characters noticed in the work by the Spanish authors should be ascribed to *P. iris*. They figured the living animal, which is reddish-orange, a peculiar colour pattern for a Northeast Atlantic-Mediterranean philinid species. The radula has the fotmula 2.1.0.1.2, and its lateral teeth are serrated, as usual on philinid gastropods. Note also that it would lack the gizzard. A reddish-orange *Philine* was also figured by Mifsud (1996: 31, fig. 30). It was identified as *Philine quadrata* (S.V. Wood, 1839), the latter species, however, has a whitish body (cf. Jeffreys, 1867: 452). Therefore the Maltese *Philine* could be the same species figured by Moreno & Templado (1998). The single shell in the MTRS is possibly from Nice (see above the Material examined), but its provenance is doubtful, according to the original label. It is in poor condition, but it seems conspecific with *P. iris*'s material.

Among the Northeast Atlantic-Mediterranean species, *Philine catena* and *Philine punctata* superficially resemble *P. iris*. *Philine catena* was also found at Cala Iris, samples A, B, and D. Its shell (Figs. 26a-b, 27, 31, 35, 37, 45, 46) may attain a much larget size than *P. iris*, even double. Despite its outline may vary, it is more abruptly restrained above a half of the height, with more straight sides. The lower part of its aperture is less evenly rounded than *P. iris*, being somewhat squared. In lateral view *P. catena* is not rounded: having its maximum dpt. much higher placed than *P. iris*, close to the top, it has a nearly triangular outline, and it is less swollen. The upper edge of the peristome of *P. catena* is less protruding above the top, and makes

with the penultimate whorl a less narrow upper sinus. Its internal lip is less flexuous - i.e. it is less marked the transition from its parietal part to the columellar one. The height of the penultimate whorl of *P. catena* does not attain 1/5 of the shell height being proportionally less high than that of *P. iris*. The chain-like sculpture of *P. catena* does not match with *P. iris*: the pits of *P. catena* (observed on the body whorl at about a half of its height) are slightly larger, and more slender; and on *P. catena* each spiral line develops more abruptly as chain-like. The protoconch of *P. catena* is smaller than *P. iris*, with a diameter of 1.8-2.0 µm ca., but they share the coarse sculpture on the upper surface.

Philine punctata (Figs. 28, 29, 30, 36a-b, 39, 40, 44) displays a somewhat variable shell, run by rows of loose pits, small, rounded, and dot-like, which do not match with the chain-like rows of *P. iris*. Moreover the protoconch of *P. punctata* has a slightly larger and more protruding nucleus, and a less coarse sculpture than *P. iris*. The general shape of the shell is similar, but *P. punctata* is more swollen in lateral view. Moreover its growth lines are less flexuous. The Atlantic *Philine condensa* VAN DER LINDEN, 1995 (: 71-73; figs. 8-9; 76, fig. 16), described on material of the Azores and Canary Islands, is here recorded for the first time from the Mediterranean, on account of few empty shells from Palermo in the MTRS (see above the Material examined). The shell of *P. condensa* (Fig. 25) shares with *P. iris* the small size, a not protruding spire, and a catenoid sculpture. However *P. condensa* is a more stumpy and swollen species, and it has a flatter top. Its aperture is less slender and less oblique. The upper margin of the peristome does not protrude above the shell top. The height of the penultimate whorl is slightly less than 1/2 of the shell height, being proportionally higher than that of *P. iris*. The chain-like sculpture is more close set and fine on the surface of *P. condensa*. Moreover *P. condensa* is known from circalittoral-bathyal waters only. *Philine arenosa* VAN DER LINDEN, 1995 (: 67-69; figs. 3-5; 76, fig. 14), was described from Cape Verde Islands, and it is also known from West Sahara (see above the Material examined). It is vaguely similar to *P. iris*, but its shape is more rounded and swollen, with a flatter top, and it displays a characteristic spiral sculpture of flexuous simple lines.

A careful examination of philinid material in Mediterranean and Northeast Atlantic collections will possibly show a wider geographic range for the new species.

Subclassis PULMONATA Cuvier, 1817
Familia ELLOBIIDAE A. Adams, 1855

Pseudomelampus kochi (Pallary, 1900)
(Figs. 47a-b)

Material examined
Pseudomelampus kochi - sample A, 1 sh. (RV coll.). *Pseudomelampus exiguus* – a mixed lot of 12 shs., from Madeira Is. and Selvages Islands, labelled by RB. Watson (MTRS, box 6918).

Remarks - PALLARY (1900: 241-242; pl. VI, fig. 9) described *Alexia (Pseudomelampus) kochi* on material from Krichtel Beach, near Oran (Algeria), together with *Alexia (Pseudomelampus) jolyi*, this latter collected at Algiers. It is likely that they are not specifically distinct, probably *P. jolyi* being a slightly larger and more swollen form of *P. kochi*. The name *P. kochi* is here adopted, being the former introduced by PALLARY (1900), and that quoted by the subsequent malacological literature, whereas *A. (P.) jolyi* is in fact an overlooked name. PALLARY (1900: 240-241) introduced the subgenus *Pseudomelampus*, describing *P. kochi* and *P. jolyi*, and including also *Melampus exiguus* Lowe, 1835, of Madeira, and *M. biscayensis* H. Fischer, 1900, from the Bay of Biscay. THIELE (1931: 464) quoted *P. kochi* alone within the genus *Pseudomelampus*, arguably considering it the type and unique species of the genus. This view matches with a note by SABELLI et al. (1990-1992: 454) which pointed out *P. kochi* as the type species of *Pseudomelampus* by monotypy. However this does not fits PALLARY's (1900) text, where four *Pseudomelampus* species are quoted without any designation of a type species. In fact the type species of *Pseudomelampus* is *Melampus exiguus*, subsequently designated by MONTEROSATO (1906: 128).

However, the taxonomic distinction of the above mentioned species is not actually clear. I have examined some shells labelled by R.B. Watson as «*Melampus exiguus*», in a mixed lot of shells from both Madeira Is. and the Selvages Islands. These shells are variable in shape, but they look closely similar to the single shell found at Cala Iris. The latter is light-caramel brown coloured, with a paler colour on the apex, the columellar callus and the thickening inside the peristome. The most part of the examined shells of *P. exiguus* are smaller (average height: 3 mm ca.), with a more marked spiral sculpture. However, the largest one attains about the same size (h.: 4.6 mm) of the shell from Cala Iris, and displays a less evident spiral sculpture than the other shells in the lot, especially on the middle of the body whorl, being in fact difficult to distinguish from the shell of Cala Iris. GOFAS (1990: 119) noticed that *Pseudomelampus* specimens from the Azores Islands and the European mainland do not show clear morphological differences. In fact it cannot be excluded that *P. exiguus* and *P. kochi* – and possibly also *P. biscayensis* - are one and the same species, but to answer this question is far beyond the limits of the present work, where the name *P. kochi* is provisionally employed. Also the status of *Pseudomelampus* raises some problems: for instance, GERMAINE (1931: 564) regarded *Pseudomelampus* as a junior synonym of *Melampus* de Montfort, 1810. Anyway, basing on the record from Cala Iris, the known range of Pallary's species would also include the Mediterranean coast of Morocco.

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The first fossil record of the genus *Chileutomia* (Eulimidae: Gastropoda) in the Mediterranean Neogene

Bernard Landau & Robert Marquet

KEY WORDS: *Chileutomia*, Eulimidae, Pliocene, Zanclean, Mediterranean.

ABSTRACT A few shells attributable to *Chileutomia miranda* (Dautzenberg, 1925) (Eulimidae, Prosobranchia, Gastropoda) have been discovered in the early Pliocene (Zanclean) deposits at Velerín near Estepona, Southern Spain. This is the first fossil record of this genus in the Mediterranean Neogene.

RIASSUNTO Pochi nicchi attribuiti a *Chileutomia miranda* (Dautzenberg, 1925) (Eulimidae, Prosobranchia, Gastropoda) sono stati rinvenuti in depositi del primo Pliocene (Zancleano) a Velerín, vicino a Estepona (Spagna meridionale). Questo è il primo reperto fossile neogenico di questo genere nel Mare Mediterraneo.

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INTRODUCTION

Only in recent years have the highly fossiliferous Pliocene (Zanclean) deposits around Velerín, Estepona (Malaga, Spain) appeared in the literature (e. g. Vera-Pelaez *et al*, 1995). These Pliocene deposits, consist of coarse sands (representing out near shore and/or beach deposits), fine clayey sands (deposited in a relatively deeper shelf environment) and coarse conglomerates, all within a half kilometre radius. The conglomerates host the most diversified macrofossil assemblages; however the most interesting small gastropods are found in fine sandy clay especially at the locality of Velerín Carretera. Here the preservation of calcareous fossils is exquisite and even fragile species rarely found as fossil (such as *Aglaja depicta* Renier, 1807) occur in such sediments. The present paper documents the first record of shells belonging to *Chileutomia miranda* (Dautzenberg, 1925) in the Mediterranean Neogene. Our record is based upon two shells sourced from Velerin Carretera and two more found within coarse sand deposits outcropping nearby at Velerin Antena.

SYSTEMATIC PALAEONTOLOGY

Family	Eulimidae	Rafinesque, 1815
Genus	*Chileutomia*	Tate & Cossmann *in* Tate, 1898
Synonyms	*Hoplopteropsis*	de Morgan, 1915;
	Auriculigerina	Dautzenberg, 1925

Discussion of genus: The genus *Hoplopteropsis*, Mogan, 1915 was synonymised with *Chileutomia* Tate & Cossmann in Tate, 1898 by COSSMANN (1921). WARÉN (1984, 1986) discussed the close relationship between *Auriculigerina* Dautzenberg, 1925, *Oceanida* de Folin, 1870 and *Chileutomia* Tate & Cossmann *in* Tate, 1898. According to this author *Chileutomia* is restricted to the Tertiary of Australia and differs from the previous two in having a deep umbilicus. *Auriculigerina* is characterised by a greater development of thickened scars from earlier positions of the outer lip present in all these genera, into wing-like varices. Indeed he suggested *Auriculigerina miranda* could be an aberrant species of the genus *Oceanida*. More recently LOZOUET (1999) considered *Auriculigerina* a synonym of *Chileutomia*, and we fully agree with this opinion, since all these genera display a strong anal notch, absent in *Oceanida*. Furthermore, the presence of the umbilicus depends on the greater or lesser development of the columellar lip and cannot be used as a character to differentiate between the genera.

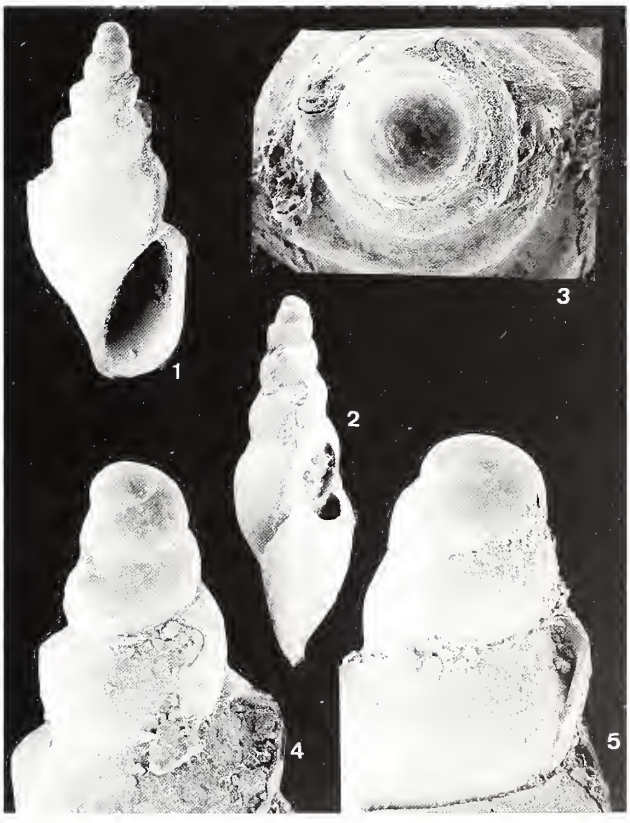

PLATE 1: *Chileutomia miranda* (Dautzenberg, 1925)
Lower Pliocene, Zanclean; Velerín conglomerates, Velerín Estepona, Spain.
Fig. 1: Frontal view; x 15.2. **Fig. 2**: Side view; x 15.2. **Fig. 3**: Protoconch apical view; x 45.8. **Fig. 4**: Protoconch; x 45.4. **Fig. 5**: Protoconch detail; x 56.8.

1925 - Auriculigerina miranda Dautzenberg, 1925: 7, fig. 5-6.
1926 - Auriculigerina miranda Dautzenberg: Dautzenberg, 1927. 170, pl. 5, fig 14-17
1927 - Auriculigerina miranda Dautzenberg: Warén 31, fig. 46-47.
1928 - Auriculigerina miranda Dautzenberg: Bouchet & Warén, 440, fig. 1042-1047.

MATERIAL STUDIED

Two specimens from the Velerín sands, two from Velerín Carretera, Estepona, Spain. All Zanclian, Lower Pliocene (no formation name).

Dimensions: figured specimen: 6.9x3.9 mm, others: 7.1x2.7 mm, 5.0x2.2 mm, 3.4x3.4 mm.

Description: Shell small, thin, turriculate, antero-posteriorly flattened, seven to eight whorls, height of the largest specimen 6.9mm, width 3.9 mm (height/width ratio 1.76). Protoconch paucispiral, about one and one half whorls, smooth, first whorl bulbous, junction with teleoconch not clearly delineated. Teleoconch about six whorls, devoid of sculpture except for very faint, closely set growth lines. Whorl profile is almost straight with a well-developed sutural ramp, giving the shell profile a stepped appearance. Two strong varices are present on the periphery of each whorl, placed almost in a linear fashion above each other, developing from the scar of the outer apertural lip. These varices are detached from the whorl and most developed adapically, where they join the suture forming a sinus. The whorl profile is therefore broadest adapically, tapering slightly towards the lower suture. Aperture elongated, oval, with the outer lip slightly flared abapically. Outer lip thickened; well-developed anal sinus; narrow, clearly delimited parietal callus. In some specimens a small umbilical cleft is formed between the columella and the last varix on the body whorl. The thickness of the outer lip and strength of the umbilical cleft varies between specimens.

REMARKS

Auriculigerina miranda is a rare taxon. Originally described from deep water off the Azores and, more recently, recorded also from shallower depths offshore Sicily (Bouchet & Warén, 1986, p. 440). Three european Tertiary species have been described, all from French Atlantic deposits under the various generic names mentioned above. The oldest is *Chileutomia paulinensis* Lozouet, 1999, recorded from the Late Oligocene, *Hoplopteropsis pontileviensis* de Morgan, 1915, from the Pontilevien, Middle Miocene and the Late Miocene (Redonian) *Chileutomia morgani* Cossmann *in* de Morgan, 1915. *Chileutomia paulinensis* Lozouet, 1999, differs from *C. miranda* by having a multispiral protoconch with about one extra whorl; the teleoconchs of both species are remarkably similar and characterised by strongly developed varices. *Chileutomia pontileviensis* (de Morgan, 1915) has a paucispiral, bulbous protoconch (like *C. miranda*), but differs by having a more elongated, less stepped teleoconch and differs from from both *C. paulinensis* and *C. miranda* by having lesser developed varices. Judging from the original figure *Chileutomia morgani* Cossmann *in* de Morgan, 1915 has even weaker varices than *C. pontileviensis* and a larger and more oval aperture than any of the previous species. According to Warén (1984, p. 49) 'The figure of that species shows distinctly carinated apical whorls, as in *Menon*', placed by him in the Rissoacea. Neither the figure nor the description given by de Morgan (1915, p. 340, fig. 36) suggest carinated whorls and due to the lack of further material, we prefer to keep the original generic designation.

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Gibbula saeniensis n. sp. (Gastropoda: Trochidae) del Pliocene Toscano

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KEY WORDS: Gastropoda, *Gibbula saeniensis*, new species, Pliocene, Tuscan, Italy

ABSTRACT The Authors describe *Gibbula saeniensis* n. sp. from infralittoral grey silty-sand bed outcropping at "Podere Melograni" (S. Gimignano, Siena, Italy). The outcrop is attributed to middle-lower Pliocene. The new species has been found in some other nearby deposits: Pietrafitta, Terre Rosse, Castel S. Gimignano and Bibbiano. These deposits are grey silty-sand or yellow sand, their age ranges between middle-lower Pliocene and middle Pliocene. *Gibbula saeniensis* is not rare in this area but as far as we know its distribution is restricted to this area of Tuscan.
Gibbula saeniensis is characterised by the large size (max. height about 23 mm) and the strong spiral ribs, separated by deep interspaces, covering the whorls and the base. There are six spiral ribs on the last whorl and about seven on the base. Sometime the spiral ribs have a central or sub-central longitudinal superficial sulcus.
This species was possibly found by Pantanelli that listed (Pantanelli, 1880) for "Poggio della Staffa" (a locality near Pietrafitta) a *Trochus succinctus* Monterosato, 1880, that is a recent species, considered a form of *G. ardens* (von Salis, 1793) showing some similarities with *G. saeniensis*, but it is much smaller, with light and thin spiral ribs.
Authors suppose that *G. saeniensis* might be a descendant of the Miocenic *Trochus quadristriatus* Dubois, 1831, survived up to middle Pliocene this restricted area. Another endemism of this area seems to be *Chiton saeniensis* Laghi, 1984.

RIASSUNTO Viene descritta *Gibbula saeniensis* n. sp. da depositi infralitorali di sabbie-argillose grigie o sabbie gialle del Pliocene medio-inferiore senese.

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INTRODUZIONE

Il genere *Gibbula* Risso, 1826 è ben rappresentato nel Terziario e Quaternario europeo. Attualmente sono viventi nel Mediterraneo oltre venti specie e innumerevoli forme locali, talvolta marcatamente diverse dalla forma tipo. Le specie del genere *Gibbula* sono prettamente litorali, capaci di colonizzare ambienti di battigia ad elevato idrodinamismo, lagune salmastre dell'alto Adriatico, fondi algali e detritici infralitorali e circalitorali.

Numerose le specie del genere *Gibbula* note per il Pliocene della Toscana, ed in particolare per i depositi affioranti nell'area di Siena. SPADINI (1986) segnala a Terre Rosse (SI), ove sono presenti affioramenti attribuiti al Pliocene medio, ben quindici specie di *Gibbula*, e istituisce la nuova specie *G. (Phorcus) terrerossae*. Recentemente ANDREOLI & MARSIGLI (1997) hanno descritto la nuova specie *G. bertarellii* rinvenuta in depositi di sabbie e ghiaie gialle a Serre di Rapolano (SI).

Gibbula saeniensis n. sp.

DESCRIZIONE

Conchiglia solida, conica, elevata. Profilo gradato per il gradino alla sutura adapicale. Base leggermente convessa. L'ornamentazione consiste in cingoli spirali e strie di accrescimento lamellose. I primi giri presentano quattro cingoli spirali principali più un quinto, meno sviluppato, parzialmente immerso nella sutura abapicale e separato dal precedente da un solco largo il doppio degli altri. Circa al quarto giro appare un sesto cingolo nella spalletta del giro, questo cingolo resta sempre meno sviluppato dei precedenti. Il cingolo che delimita la spalletta è più largo e talvolta leggermente sdoppiato da un solco centrale. Alcuni esemplari mostrano parte o tutti i cingoli spirali con un solco intermedio. Gli interspazi sono profondi. Sui primi giri sono larghi circa il doppio dei cingoli, successivamente si restringono, divenendo larghi all'incirca quanto i cingoli. Le strie di accrescimento hanno andamento prosoclino e formano un angolo di circa 30° con l'asse della conchiglia. Le strie passano sopra i cingoli e negli interspazi sono lamellose. L'ultimo giro presenta un cingolo spirale periferico, che viene poi parzialmente coperto dalla sutura. La base presenta sette cingoli spirali e strie di accrescimento lamellose. Ombelico largo e profondo. Apertura subromboidale. Columella obliqua con ingrossamento centrale. Il labbro esterno è sottile ed anche all'interno è ondulato, come se i cingoli esterni fossero delle ondulazioni della parete.

L'olotipo e alcuni paratipi mostrano tracce di colore: il fondo sembra colore crema con larghe flammule rossicce ad andamento opistoclino. Opercolo sconosciuto.

L'olotipo (Figg. 4, 5, 6) è alto 22,7 mm, largo 20,2 mm e possiede circa 6 giri di teleoconca. L'olotipo è il più grande esemplare rinvenuto. Negli esemplari esaminati il rapporto altezza/diametro è compreso tra 1,0 e 1,3 (vedi Figg. 1, 2, 3).

LOCALITA' TIPO

"Podere Melograni" (S. Gimignano,Siena), sabbie argillose grigie di ambiente infralitorale. Età presunta del giacimento Pliocene medio-inferiore.

MATERIALE ESAMINATO E COLLOCAZIONE DEI TIPI

Nel seguito è elencato il materiale tipo depositato e presente

nelle collezioni degli Autori. Altri esemplari dalle medesime località sono presenti in varie collezioni private.

- "Podere Melograni" (SI) località tipo:

Olotipo depositato presso il Museo di Zoologia dell'Università di Bologna col numero MZB-13991.

Tre paratipi in coll. Micali, sette paratipi in coll. Chirli.

Altro materiale esaminato:

- Pietrafitta (SI): otto esemplari coll. Chirli.
- Terre Rosse (SI): due esemplari coll. Chirli.
- Poggio alla Staffa (Pietrafitta, SI): undici esemplari coll. Chirli.
- Castel S. Gimignano (SI): sei esemplari coll. Micali.
- Bibbiano (SI) : quattro esemplari coll. Chirli.

DERIVAZIONE DEL NOME

Aggettivo derivante dal nome latino della città di Siena (*Saena*), capoluogo della provincia ove si trovano tutte le località di rinvenimento.

DISTRIBUZIONE

Tutti gli esemplari esaminati provengono da depositi ubicati nella provincia di Siena. Il deposito di "Podere Melograni" è attribuito al Pliocene Medio-inferiore ed è un piccolo calanco largo pochi metri di sabbie argillose grigie entro a sabbie gialle. Chirli (1995) tratta dei *Caecum* rinvenuti a "Podere Melograni" e successivamente (Chirli, 1997) menziona la ricchezza della malacofauna rinvenuta, con presenza di esemplari in posizione di vita. Si rinvengono inoltre varie specie di *Conus* con tracce della colorazione originaria, esemplari della rara *Aspella anceps* (Lamarck, 1822) e molti micromolluschi in perfetto stato di conservazione.

Non avendo notizia di rinvenimenti in altre aree e non avendo trovato in bibliografia alcuna foto o disegno riferibile a questa specie, si ipotizza una distribuzione limitata a quest'area e al Pliocene medio. Attualmente esistono nel Mediterraneo alcune specie di trochidi con un areale di distribuzione limitato, ad esempio *G. adriatica* (Philippi, 1844) e *Calliostoma virescens* Coen, 1933 sono presenti solo nell'Alto Adriatico, *G. spratti* è endemica del Mar Egeo, *G. ditropis* (Wood, 1848) ha distribuzione limitata all'area dello Stretto di Gibilterra e *Jujubinus seguenzae* Ghisotti & Melone, 1975 è endemico dello Stretto di Messina.

Anche LAGHI (1984) mostra sorpresa per la locale abbondanza di *Chiton saeniensis* e la mancanza in altre aree limitrofe, ipotizzando tra l'altro che possa trattarsi di un endemismo derivato da una speciazione allopatrica da *Chiton olivaceus* Spengler, 1797.

Nel caso di *G. saeniensis* si esclude l'ipotesi di un ecofenotipo endemico di un'altra specie, in quanto nettamente differente da tutte le altre specie. Si ipotizza piuttosto una derivazione da una specie miocenica (es. *Trochus quadristriatus* Dubois, 1831). E' possibile che una popolazione miocenica abbia superato la crisi di salinità avvenuta alla fine del Miocene e sia sopravvissuta in un'area ristretta, differenziandosi a livello specifico. L'estinzione è probabilmente avvenuta in seguito al deterioramento climatico medio-sopraPliocenico.

DISCUSSIONE

La specie oggetto del presente lavoro non è rara nel senese e presumibilmente è nota ai paleontologi da oltre un secolo. PANTANELLI (1880) elenca per la località di Poggio della Staffa (Pietrafitta) "*Trochus succinctus*, Monts.", e si ritiene verosimile che si riferisse alla nuova specie qui descritta.

Trochus succinctus viene dapprima menzionato da MONTEROSATO (1878) come *nomen nudum* e successivamente compiutamente descritto, ma non figurato, dallo stesso MONTEROSATO (1880), basandosi su materiale dal Golfo di Gabes (Tunisia). La nuova specie viene così descritta: "*Forma ben caratterizzata e costante con un profondo solco alla sotura e tutta fortemente solcata*". Successivamente lo stesso MONTEROSATO (1888) include questa specie tra quelle rinvenute nel porto di Palermo e cambia il nome in *G. subcincta*, esistendo già una *G. succincta* Carpenter, 1864 della California.

B.D.D. (1882) ritengono *T. succinctus* Monterosato, 1880 varietà di *G. ardens* (von Salis, 1793) e ne danno la prima iconografia, basata su esemplari reperiti nelle spugne del Golfo di Gabes. Poiché la prima iconografia è del 1882 c'è da supporre che PANTANELLI (1880) conoscesse solo la descrizione di Monterosato, nella quale non si precisa se la conchiglia sia depressa o elevata.

Gibbula saeniensis può essere anche confrontata con due specie attuali, ma presenti nel bacino del Mediterraneo fin dal Pliocene: *G. ardens* (von Salis, 1793) e *G. albida* (Gmelin, 1791).

Gibbula saeniensis differisce da *G. ardens subcincta* Monterosato, 1888 (Fig. 7,8) figurata in B.D.D. (1882, pl. 45 figg. 13-16) per i seguenti caratteri:

- forma conica elevata anziché depressa con rapporto altezza/diametro uguale o maggiore di 1 contro 0,7.
- dimensioni massime circa doppie.
- cingoli spirali larghi e regolari, separati da interspazi profondi, mentre in *G. ardens subcincta* i cingoli spirali sono irregolari e, come affermato in B.D.D. (1882), alcuni dei cordoni sono normalmente gemmulati.
- la rampa suturale è stretta e appena incavata con un cingolo interno, mentre *G. ardens subcincta* possiede un canale suturale profondamente incavato e senza cingolo interno.

Per via del rapporto altezza/diametro *Gibbula saeniensis* può essere confrontata con *G. ardens barbara* Monterosato, 1888 (Figg. 9, 10) figurata in B.D.D. (1882, pl. 45 figg. 17-20) che tuttavia è più piccola (altezza max circa 10 mm), i cingoli spirali sono poco elevati e l'incavo suturale è profondamente incavato e senza cingolo interno.

Gibbula saeniensis differisce nettamente da *G. albida* (Figg. 11, 12) perché in quest'ultima i cingoli spirali sono larghi circa 1/4 degli interspazi e pochissimo rilevati, la base è angolata, le strie di accrescimento sono molto più fitte e l'ombelico è parzialmente occluso dal callo interno. Inoltre *G. albida* presenta una larga rampa suturale, per cui ha forma più gradata.

Gli esemplari di *G. ardens* figurati in SACCO (1896) e REPETTO & CAVALLO (1994) corrispondono alla forma attualmente vivente lungo le coste italiane.

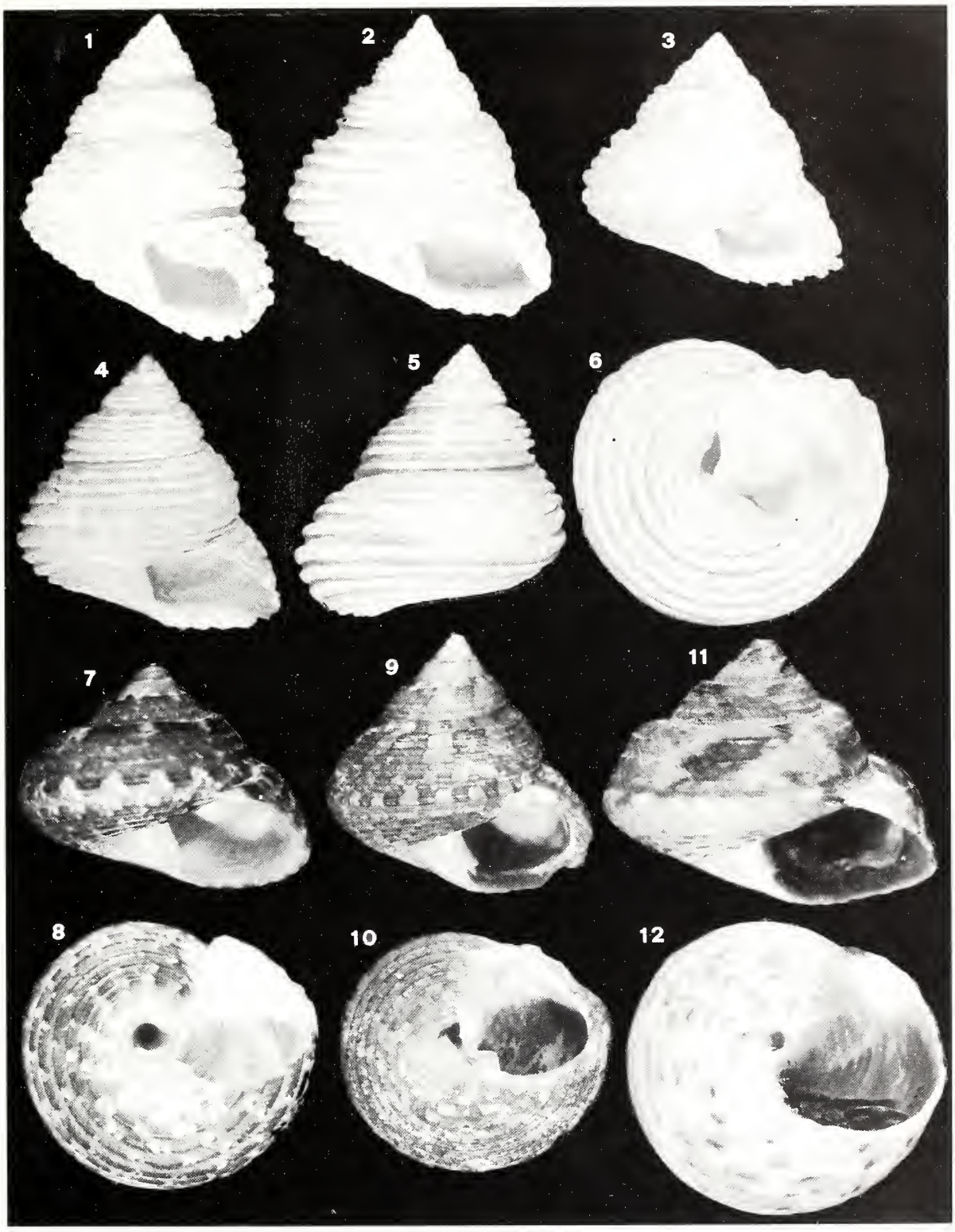

Fig. 1 - *Gibbula saeniensis* n. sp., paratipo da "Podere Melograni" (SI), Pliocene medio-inferiore. Altezza 22,7 mm. Coll. Chirli. Fig. 2 - *Gibbula saeniensis* n. sp., paratipo da "Podere Melograni" (SI), Pliocene medio-inferiore. Altezza 21,8 mm. Coll. Chirli. Fig. 3 - *Gibbula saeniensis* n. sp., paratipo da "Podere Melograni" (SI), Pliocene medio-inferiore. Altezza 14,6 mm. Coll. Chirli. Fig. 4 - *Gibbula saeniensis* n. sp., olotipo da "Podere Melograni" (SI), Pliocene medio-inferiore. Altezza 22,7 mm. Fig. 5 - idem, vista posteriore. Fig. 6 - idem, vista basale. Fig. 7 - *G. ardens subcincta* Monterosato, 1888 da Banjole (Pola, Croazia) -8 m. Altezza 7 mm. Fig. 8 - idem, vista basale. Fig. 9 - *G. ardens barbara* Monterosato, 1888 da Borj Jilij (Jerba, Tunisia). Altezza 10 mm. Fig. 10 - idem, vista basale. Fig. 11 - *G. albida* (Gmelin, 1791) da Trieste -1 m. Altezza 13,5 mm. Fig. 12 - idem, vista basale.

Tra le specie mioceniche, due sono confrontabili con la nuova specie: *Turbo parkinsoni* Basterot, 1825 e *Trochus quadristriatus* Dubois, 1831 del Miocene medio della Francia.

Turbo parkinsoni così come figurato da GRATELOUP (1840) presenta giri più convessi, senza angolosità basale, solo quattro cingoli spirali sulla base e la columella arcuata che rende l'apertura di forma sub-circolare.

Trochus quadristriatus è specie molto polimorfa. GLIBERT (1949) descrive quattro "tipi", basandosi sul numero di cingoli spirali, maggiore o minore evidenza delle strie di accrescimento, forma generale, profilo dei giri e della base. *Gibbula saeniensis* ne differisce per i seguenti caratteri:

- altezza massima circa 23 mm contro 12,5 mm.
- tutti i cordoni centrali sono della stessa larghezza anziché alternati larghi e sottili.

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Prima segnalazione di *Retusa minutissima* (Monterosato, 1878, H. Martin ms.) nel Pliocene italiano

Maria Angela Baroncelli, Lorenzo Mariano Gallo & Giovanni Repetto

KEY WORDS: *Retusa minutissima*, Mollusca, Pliocene.

ABSTRACT First evidence of *Retusa minutissima* from the Italian Pliocene. *Retusa minutissima* (Monterosato, 1878, H. Martin ms.) is recorded from a Pliocene outcrop of Northern Italy (Monale, Piemonte). This is the oldest record for the species. A list of the mollusc species found in the outcrop assemblage is given.

RIASSUNTO *Retusa minutissima* (Monterosato, 1878, H. Martin ms.) era finora nota solo per l'attuale e per il Pleistocene. Con la presente nota si segnala per la prima volta un esemplare di questa specie per il Pliocene, da un affioramento dell'Italia Settentrionale (Monale, Piemonte). Viene anche fornita una lista delle altre specie di molluschi trovate nello stesso campione.

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G. REPETTO, Museo Civico «F. Eusebio» - Alba (CN)

Durante una serie di campionamenti effettuati nell'Astigiano, nell'ambito del progetto "sedimentoteca" (GALLO & REPETTO, 1998), è stato esaminato un affioramento situato ad alcuni chilometri da Asti, nel comune di Monale, poco a N della località Cascina Salesina, sul lato destro della valle del Rio Monale (fig. 1). L'intera area è caratterizzata da una densa copertura vegetale, sia spontanea sia a coltivi. Il sito esaminato è costituito da una piccola scarpata artificiale, esposta per circa 10-12 metri di lunghezza e con spessore massimo di circa 1.5 metri, parallela ad un fossato per il deflusso delle acque piovane lungo il margine della strada. Dal punto di vista litostratigrafico l'affioramento è costituito da sabbie grigio-giallastre, a molluschi prevalenti, appartenenti alla formazione delle Sabbie di Asti, più precisamente al livello ad *Isognomon maxillatus* (CARETTO, 1963; FERRERO, 1971; FERRERO & PAVIA, 1996), che si presenta con potenze apparenti variabili da 25 cm a 40 cm.

La raccolta è stata effettuata mediante il prelievo di un campione di circa 10 dm^3. Dopo il lavaggio di circa metà del sedimento, è stato eseguito il picking, isolando tutti i resti fossili determinabili.

Lo stato di conservazione in generale è buono, sebbene alcuni bivalvi siano risultati particolarmente fragili per l'elevato grado di decalcificazione.

Le specie a tutt'oggi identificate nel sito sono:
Diloma (Paroxystele) patulum (Brocchi, 1814)
Bittium latreillii (Payraudeau, 1826)
Bittium reticulatum (Da Costa, 1778)
Caecum trachea (Montagu, 1803)
Calyptraea chinensis (L., 1758)
Crepidula unguiformis Lamarck, 1822
Natica (Naticarius) tigrina (Defrance, 1825)
Neverita josephinia Risso, 1826
Epitonium sp.
Eulima glabra (Da Costa, 1778)
Nassarius (Gussonea) semistriatus (Brocchi, 1814)
Nassarius (Sphaeronassa) mutabilis (L., 1758)
Cancellaria (Cancellaria) cancellata (L., 1767)
Strioterebrum reticolare Pecchioli in Sacco, 1891
Clathrella clathrata (Philippi, 1844)
Eulimella sp.
Syrnola (Syrnola) subumbilicatoides (Sacco, 1892)
Odostomia (Odostomia) cf. *turriculata* Monterosato, 1869
Odostomia (Odostomia) unidentata (Montagu, 1803)
Odostomia (Megastomia) conoidea (Brocchi, 1814)
Acteon semistriatus (Férussac, 1822)
Retusa decussata Sacco, 1897, Bonelli ms.
Retusa truncatula (Bruguière, 1792)
Retusa minutissima (Monterosato, 1878, H. Martin ms.)
Cylichnina umbilicata (Montagu, 1803)
Ringicula auriculata (Ménard de la Groye, 1811)
Roxania (Roxania) utriculus (Brocchi, 1814)
Acteocina spirata (Brocchi, 1814)
Nucula nucleus (L., 1758)
Nuculana (Lembulus) pella (L., 1767)
Arca noae L., 1758
Barbatia (Ambrogia) mytiloides (Brocchi, 1814)
Glycymeris glycymeris (L., 1758)
Glycymeris insubrica (Brocchi, 1814)
Atrina pectinata (L., 1758)
Isognomon maxillatus (Lamarck, 1801)
Pecten rhegiensis (Seguenza, 1880)
Chlamys (Flexopecten) inaequicostalis Lamarck, 1819
Lissochlamys excisum (Bronn, 1831)
Ostrea edulis L., 1758
Lucinella divaricata (L., 1758)
Diplodonta rotundata (Montagu, 1803)
Litigiella glabra (Fischer P., 1873)

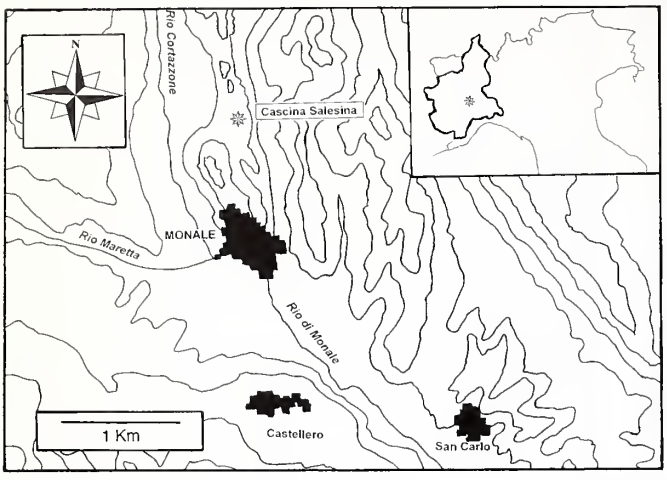

Figura 1. Localizzazione del sito di ritrovamento di *Retusa minutissima* (MONTEROSATO, 1878, H. MARTIN ms.).

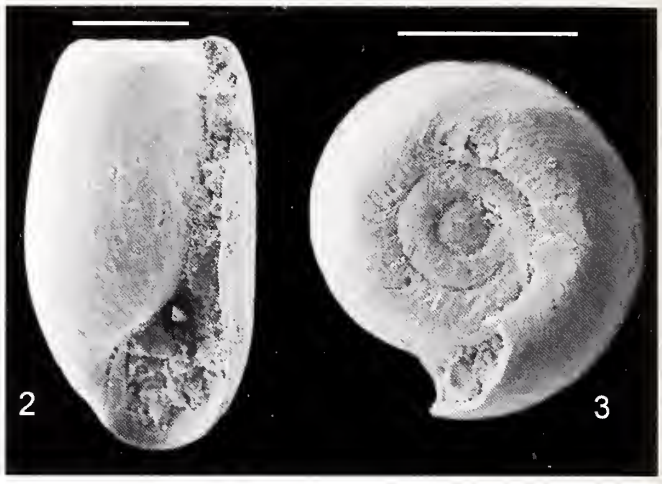

Figure 2, 3. *Retusa minutissima* (MONTEROSATO, 1878, H. MARTIN ms.). Esemplare rinvenuto nelle sabbie plioceniche di Monale. 2: visione frontale; 3: visione apicale. Scala 500 µm

Glans (Glans) intermedia (Brocchi, 1814)
Glans (Glans) rudista (Lamarck, 1822)
Spisula subtruncata (Da Costa, 1778)
Solen marginatus Pulteney, 1799
Tellina (Moerella) donacina L., 1758
Donax (Donax) minutus Bronn, 1831
Donax (Donax) variegatus Gmelin, 1791
Donax (Serrula) trunculus L., 1758
Psammobia (Psammobia) fervensis (Gmelin, 1791)
Psammobia (Psammobia) uniradiata (Brocchi, 1814)
Abra (Abra) prismatica (Montagu, 1808)
Abra (Syndosmya) alba (Wood W., 1802)
Azorinus (Azorinus) chamasolen (Da Costa, 1778)
Venus (Circomphalus) foliaceolamellosa (Dillwyn, 1817)
Chamalea gallina L., 1758)
Clausinella scalaris (Bronn, 1831)
Timoclea ovata (Pennant, 1777)
Gouldia minima (Montagu, 1803)
Callista chione (L., 1758)
Pelecyora gigas (Lamarck, 1818)
Corbula (Varicorbula) gibba (Olivi, 1792)
Panopea glycimeris (von Born, 1778)

Tra i gasteropodi è risultato di particolare interesse il ritrovamento di un unico esemplare di *Retusa minutissima* (Monterosato, 1878, H. Martin ms.), un microscopico retuside noto per l'attuale e, dubitativamente, per il Pleistocene siciliano (OLIVERIO & TRINGALI, 2001). Per ulteriori note sulla specie in questione si rimanda a OLIVERIO & TRINGALI (2001) e a TRINGALI & OLIVERIO (2001) in cui per *Retusa minutissima* vengono riferite considerazioni e conclusioni analoghe a quelle a cui si era giunti indipendentemente dagli Autori suddetti.

L'esemplare (Fig. 2, 3) è stato depositato nelle collezioni paleontologiche del Museo Regionale di Scienze Naturali di Torino (numero di ingresso provvisorio MRSN P238).

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First record of *Anadara demiri* (Piani, 1981) (Bivalvia: Arcidae) in Italian waters

Elisabetta Morello & Cristiano Solustri

KEY WORDS: *Anadara demiri, Anadara inaequivalvis*, Arcidae, Adriatic Sea, allochthonous

ABSTRACT Large samples of the lessepsian migrant, *Anadara demiri* (Piani, 1981), native of the Indo-Pacific, were collected during a sampling programme for the baby clam, *Chamelea gallina*, with hydraulic dredges in the central Italian Adriatic Sea. This is the first time the species has been reported for Italian waters, having been previously observed in the bay of Smirne in Turkey (DEMIR, 1977) and in the gulf of Thermaikos and the bay of Thessaloniki in Greece (ZENETOS, 1994). The great similarity of *A. demiri* to the other allochthonous clam, *Anadara inaequivalvis* (Bruguiére, 1789), established in the central Adriatic since the early seventies (RINALDI, 1972; GHISOTTI, 1973), lead to a morphometric comparison of the shells, in order to clarify the morphological differences between the two species. Differences in main shell characteristics are discussed.

RIASSUNTO Nel corso di una serie di campionamenti con draga idraulica per la valutazione dei banchi di vongole (*Chamelea gallina*) nel medio Adriatico (FROGLIA, 1989), sono stati rinvenuti numerosi esemplari di *Anadara demiri* (Piani, 1981). Questa specie, originaria dell'Indo-Pacifico, non è mai stata segnalata nelle acque marine del territorio italiano. In Mediterraneo fu individuata, per la prima volta, nella baia di Smirne, in Turchia (DEMIR, 1977) e, successivamente, nel golfo di Thermaikos e nella baia di Salonicco in Egeo (ZENETOS, 1994). Data la sua notevole somiglianza con la congenere *Anadara inaequivalvis* (Bruguiére, 1789), presente nel mare Adriatico da quasi trent'anni (RINALDI, 1972; GHISOTTI, 1973), è stato effettuato un confronto, tra le due specie, di alcuni parametri morfometrici della conchiglia. Le differenze morfologiche tra le due specie sono discusse.

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INTRODUCTION

The past twenty years have seen the successful colonisation of the Adriatic Sea by molluscs of extra-M/m origin such as *Rapana venosa*, *Xenostrobus* sp. and *Tapes philippinarum*. Individuals of newly established species generally have average dimensions which are greater than those reported for their native areas, probably due to the high nutrient concentrations typical of the Adriatic basin (RINALDI & TAMBINI, 1999) and most of the time such colonisations result in huge population explosions, generally coincident with eutrophication peaks (RINALDI, 1991; RINALDI & TAMBINI, 1999). A recent example is that of *Anadara inaequivalvis* (Btuguière, 1789) which was, probably, accidentally introduced into the Mediterranean basin through the Suez Canal at the post-larval stage and first observed in the Adriatic Sea 30 years ago (RINALDI, 1972; GHISOTTI, 1973). In addition to *A. inaequivalvis*, other membets of the sub-family Anadarinae present in the Mediterranean basin are *Anadara corbuloides* (Monterosato, 1878), *Anadara demiri* (Piani, 1981), *Anadara diluvii* (Lamarck, 1805) and *Anadara natalensis* (Krauss, 1848). Amongst these only *A demiri* and *A. natalensis*, both lessepsian migrants, have never been reported for Italian waters.

Within the Mediterranean Sea, *A. demiri* was first recorded in the Bay of Izmir, in Turkey (DEMIR, 1977), as *Scapharca amygdalum*, and later in the gulfs of Thermaikos and Thessaloniki in the Aegean Sea (ZENETOS, 1994).

A large number of *A. demiri* specimens was collected in 2000 during a survey carried out with hydraulic dredges (FROGLIA, 1989) to evaluate the stock of baby-clams - *Chamelea gallina* (L.) - in the Italian central Adriatic Sea (table 1). *A. demiri* is native of the Indo-Pacific (Piani, 1981) and this is the first sighting of it in Italian waters, its northerly distribution in the Mediterranean previously being limited to the Aegean Sea. Due to the great variation in shell morphology of *A. demiri* and to its conspicuous similarity to *A. inaequivalvis*, a morphometric comparison of the shells was made to discriminate the two species.

METHODS

Specimens of *A. demiri* (fig. 1) collected by the Authors were identified, with the aid of Mr Emidio Rinaldi, by comparison with those collected in Turkey (bay of Smirne) and Greece (gulf of Thermaikos and bay of Thessaloniki) by Demir (1977) and Zenetos (1994), respectively. In order to futther clarify the morphological differences between *A. demiri* and *A. inaequivalvis* (fig.2), a random sample of 50 individuals of each species was selected from the collected material (table1) and the following measurements and counts were made:

L = maximum length of shell (mm);
H = height of shell at the umbo (mm);
W = maximun width of the left valve (mm)
R = number of ribs

Regression equations of the linear type, $Y = a + bX$, were calculated for length-height (L-H) and length-thickness (L-S) relationships for both species. Due to the non-normal distribution of the data, a Mann-Whitney test (ZAR, 1999) was used to compare

height/length (H/L) and thickness/length (S/L) ratios. The number of ribs (R) of the two species was compared using a two-tailed t-test (Zar, 1999).

RESULTS

The size range of the *A. demiri* specimens examined was 10.0-31.2 mm with a mean length of 21.3 ± 5.5 mm. *A. inaequivalvis* specimens ranged between 17.7 and 30.0 mm with a mean length of 25.4 ± 2.9 mm. The regression equations for both species for length/height and length/thickness relationships are summarised in table 2 and illustrated in figures 3 and 4. A highly significant difference resulted from the Mann Whitney tests carried out to compare height/length and thickness/length ratios (table 3) for the two species. Figures 3 and 4 illustrate this clearly, showing that *A. inaequivalvis* has significantly greater thickness/length and height/length ratios than *A. demiri*. The main features of the shell of *A. demiri*, as described by DEMIR (1977), are herein presented:

"Shell solid. Completely closing all along its margins. Some shells, especially in young phases, have a slight depression on each valve, or on the right valve radiating from the beak to the ventral margin where the byssus emerges. This depression is seen on the valves of old shells, too, but usually only at the umbonal part. Inequivalve: left valve overlaps right valve and is more conspicuous posteriorly. Inequilateral: incurved beaks approximately at the end of the anterior third of the length of the hinge margin. Ovate-oblong in shape, ovateness varies from shell to shell. Hinge margin straight. Upper corners angulated, in some shells slightly auriculated, too. Sculpture of radiating ribs, concentric ribs and concentric furrows of growth. Periostracum scaly between ribs. Hinge plate long, straight, somewhat wide at extremities, becoming narrow at the centre."

The number of ribs in *A. demiri* ranged from 29 to 35 with a mean value of 33.1 ± 1.5 and for *A. inaequivalvis* from 31 to 35 with a mean value of 32.6 ± 1.0. The two-tailed t-test (table 4) carried out to compare the two species resulted non-significant at $p = 0.05$.

CONCLUSIONS

The results summarised in tables 2 and 3 show that, compared to *A. inaequivalvis* (fig. 2), *A. demiri* (fig. 1) has a shell which is, within the same length range, narrower and less globose, confirming previous descriptions. Nevertheless, there is no significant difference in the number of ribs of the two species; character which, therefore, cannot be used for discrimination purposes.

A. demiri was first reported in Turkey in the late 1970's (DEMIR, 1977) and in Greece (ZENETOS, 1994) twenty years later. Its presence in the Italian Adriatic today could indicate some conformity with the Island Jumping Model (GOFAS, 1992; CHEMELLO & OLIVERIO, 1996) as evidenced by another lessepsian migrant, *Brachidontes pharaonis* (P. Fischer, 1870) (GIANGUZZA *et al.*, 1998) Alas, insufficient data are available on such dispersal for an accurate prediction to be made on its progressive expansion towards Italian waters, whether by a step by step colonisation or by a more likely anthropogenic input. This first recording of *A. demiri* in the Adriatic Sea expands the extent of its westerly and northerly distribution significantly. It would now be interesting to carry out a detailed study on the establishment of the species in Italian waters, giving an account on its recruitment patterns, in light of the fact that a significant settlement of spat was found off Porto Recanati, south of the Ancona area.

A. inaequivalvis mainly inhabits sandy bottoms (CESARI & PELLIZZATO, 1985), although its great physiological adaptability enables it to survive under critical conditions and adapt to different habitats, often displacing the less resistant native species (BROOKS *et al.*, 1991; CATTANI, 1992). Similarly, ZENETOS (1994) reported the presence of *A. demiri* in the gulf of Thessaloniki to be invariably linked to unfavourable environmental conditions, where the highest densities (up to 180 individuals per square metre) were found in polluted waters, leading to the proposition of it being used as an indicator species. Owing to this, competition could arise between *A. demiri* and the allochthonous *A. inaequivalvis*.

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Figure 1 - *Anadara demiri* (18.6mm)

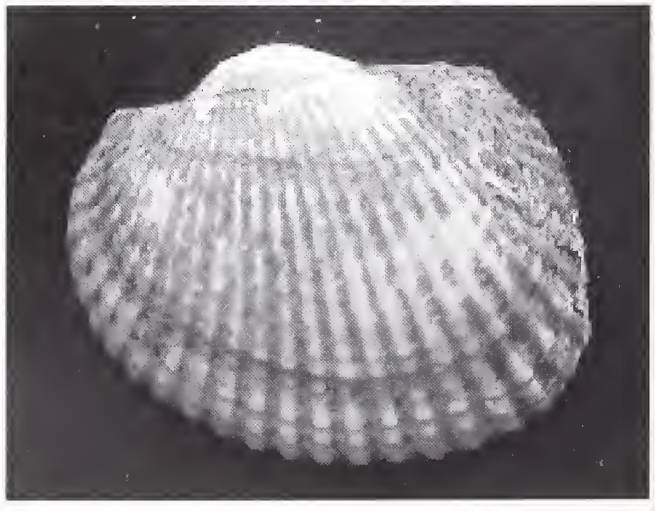

Figure 2 - *Anadara inaequivalvis* (17.3mm)

Locality and date	coordinates	species	depth	substrate
Palombina di Ancona 04/09/2000	43° 38.42N 13° 26.26E	*A. demiri* *A. inaequivalvis*	10 metres	Sandy
Porto Recanati 14/09/2000	43° 25.71N 13° 42.66E	*A. demiri* *A. inaequivalvis*	11 metres	Sandy

Table 1 - Sampling locality of examined specimens.

Relationship	Species	Regression equation	R^2	N
L-H	*A. demiri*	H=0.6231L - 0.2781	0.9459	50
	A. inaequivalvis	H=0.7572L + 1.1564	0.8768	50
L-S	*A. demiri*	S=0.2434L + 0.0331	0.8809	50
	A. inaequivalvis	S=0.3555L + 0.1632	0.7808	50

Table 2 - Regression equations.

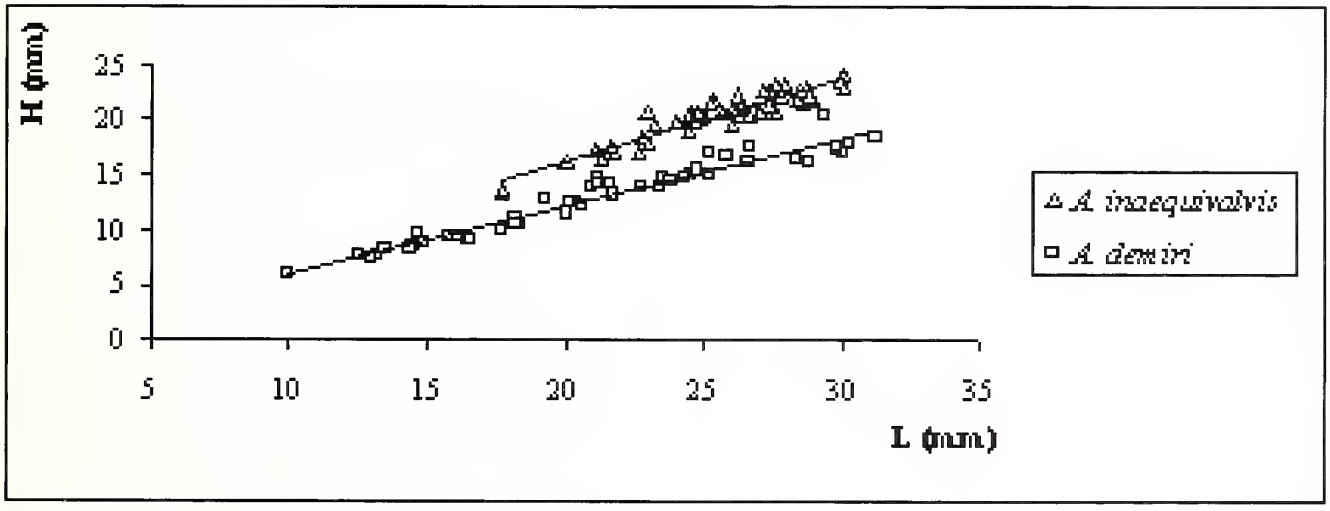

Figure 3 - Height/length relationship for *A. inaequivalvis* and *A. demiri*.

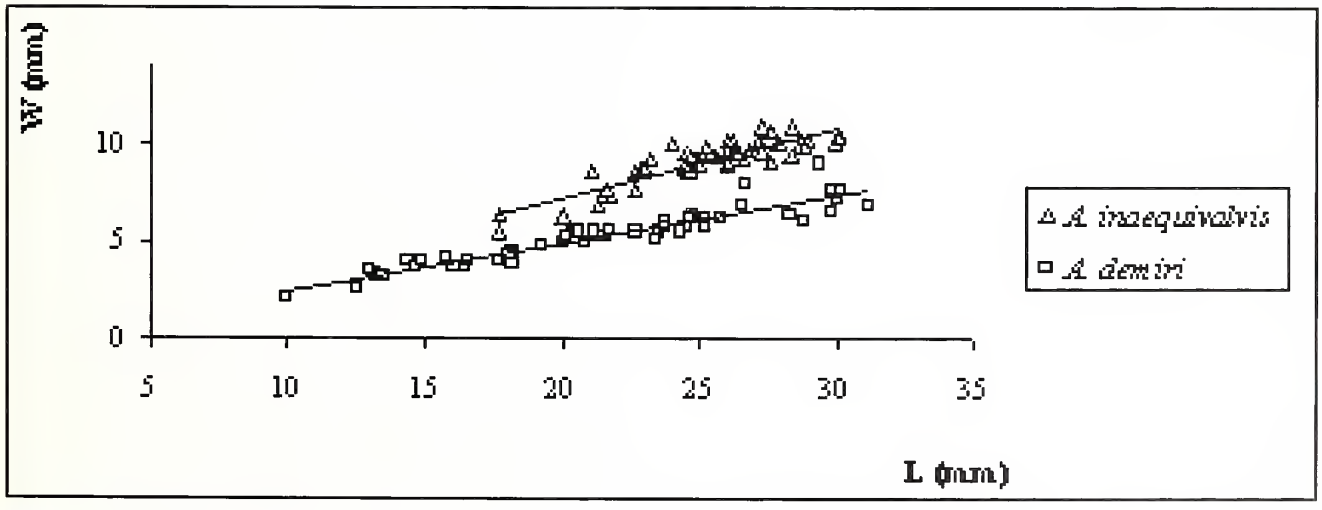

Figure 4 - Width/length relationship for *A. inaequivalvis* and *A. demiri*.

Ratio	Zo	Zc
H/L	- 8.6167	1.96
S/L	- 8.6167	1.96

Table 3 - Z values for the Mann-Whitney test on morphometric data (Zo = observed Z; Zc = critical Z at p = 0.05).

Variable	to	tc	df
R	1.75	1.98	98

Table 4 - t values for the two-tailed t-test number of ribs (to = observed t; tc = critical t at p = 0.05).

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